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TABLE OF CONTENTS PAGE 69

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Table of Contents

NEWS DEVELOPMENTS

Status of U. S. Properties in N.E.I. Still Cloaked in Mystery 72
Witnesses Bolster States' Claims to Submerged Lands 73
Navy Turns Back Four Refineries as Settlement Pace Quickens 74
Bailey Tells FPC Mississippi Opposes Natural-Gas Restrictions 76
Texas' Position Is Clarified as Houston Hearing Ends 76
Immediate Gasoline Market Firm But Future Uncertain 77
Pauley Nomination Major Political Issue 78
Committee Finds Justification for Price Increase 80
Halpern and Saunders Made Texas Co. Directors 80
Industry Warned of Evils of Gasoline-Tax Diversions 81
International News 86

Editorial 71
This Week 75
Deaths 89
Natural-Gas News 139
Natural-Gasoline News 139
Refining News 140
Pipe-Line News 142
Statistics and Trends 144

ENGINEERING AND OPERATING

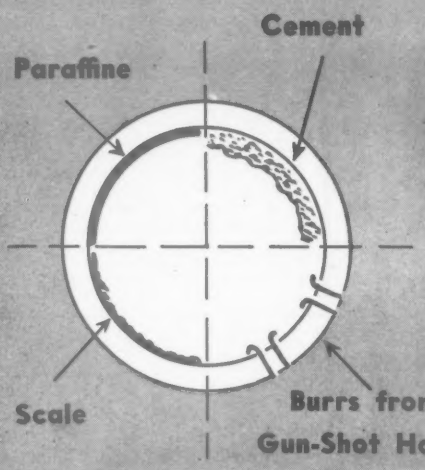
Trinity's Big Rig Capable of 20,000-Ft. Drilling 90
German Wartime Aviation Fuels Largely from Coal 92
The Optimum Rate of Production—Part 25 (Final) 94
Bearing Corrosion 100
Spudder Drills to 6,198 Ft. in Gibson County, Indiana 111
Questions on Technology 112
Book Reviews 124
The Refiner's Notebook 129
Engineering Fundamentals 131
Oil and Gas Equipment Digest 135

EXPLORATION AND DRILLING

Weekly Well-Completion Record 144
Daily Average Production for Week 145
TXL Extension Cuts Fault 147
Reports by Areas Start on Page 147

ADDITIONAL FEATURES

Market Summary 144
Crude-Oil Prices 144
Drilling Contractors 158
Personals 160
Equipment Men in News 162
Classified Advertising 163
Events on the Calendar 166
Index to Advertisers 166



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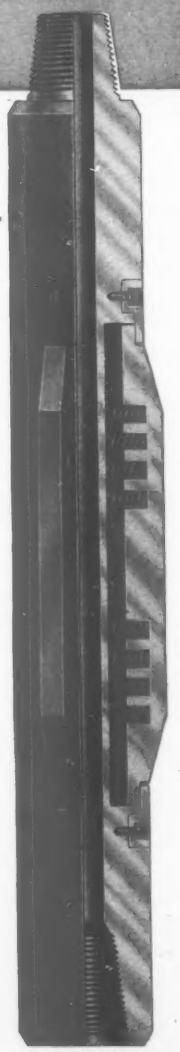

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Lighter Hydrocarbons

THE time has arrived for managements as well as economists to give both thought and action as to what to do with the lighter hydrocarbons of the petroleum industry's output. The economists have pointed out from time to time the steadily increasing production of those fractions which a few years ago either were not available or were largely wasted. While readily absorbed in the many outlets of the war period there are now excess fractions which are factors in the gasoline-market weakness.

Statistically the Bureau of Mines has endeavored to reflect the basic changes in operating trends. The latest monthly report reveals a production of natural gasoline and associated products of 308,000 bbl. daily, a total which exceeds the average monthly domestic demand for all motor fuels in 1920. Furthermore, output has increased nearly 100 per cent since 1940.

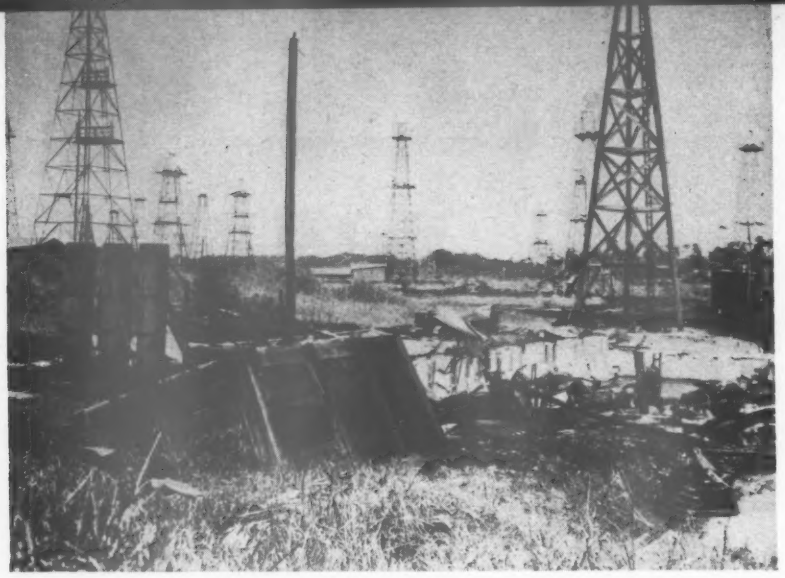
It is necessary to keep in mind that these figures do not include the production of many of the same fractions at refineries. Modern processing operations have greatly increased the production and recovery of paraffin and olefin hydrocarbons at refineries and while they are usually absorbed within the plant operation they are nevertheless a factor in the total industry supply in both domestic and foreign markets.

During the war there was no surplus. Large quantities of normal and isobutane which are the principal hydrocarbons of this general classification of products, were required in the manufacture of aviation gasolines. The heavy demands for all motor fuels also furnished a ready market.

Now with a much greater supply than ever before demands are returning to a prewar status. To this unbalanced situation must be added an assured development of the future in which output will be expanded from cycling and other production and manufacturing operations.

Some have assumed that the future demands for liquefied petroleum gases and the uses in connection with the development of a petro-chemical industry would provide the required outlets. These are expanding and important markets for certain hydrocarbons but unfortunately from a volume standpoint they will represent, in the foreseeable future, but a small part of the available supply.

What is needed is a complete analysis of present and future conditions in what now amounts to an important division of the petroleum industry's operations. Most of the output in the future as in the past must be disposed of in the blending of refinery gasolines. More needs to be known about the seasonal variations in these requirements. New processing methods are available by which the heavier components of motor fuel can be manufactured from the lighter ones. What can be done revolves around price. Solutions will come when there is a full understanding of the problem.



Oil fields of Tarakan Island which were only partially destroyed by the Japanese due to the rapid invasion by the Australian and Royal Netherlands Indies forces. (Official Netherlands photos)

Status of U.S. Properties in N.E.I. Still Cloaked in Mystery

by Warren W. Burns

NEW YORK.—The exact status of American-owned petroleum refineries and oil fields in the war-ravished Netherlands East Indies remains, 6 months after V-J Day, shrouded in mystery.

In part, the reason for this complete lack of information may be attributed to the present unrest, caused largely by roving bands of Indonesian extremists, with leaders of the self-proclaimed Indonesian Republic preparing for conferences with Netherland colonial officials in Java.

However, it is generally known in this country that an American oil mission recently visited the Dutch East Indies and, presumably, returned empty-handed in so far as obtaining any specific information about their properties in this Far Eastern area.

The "mystery angle" to this lack of information is that while these men traveled thousands of miles by plane to the Dutch East Indies that they were not only prevented from inspecting their oil properties, but that they returned without having obtained any specific reasons for not having gained entry.

But it is a reasonably good guess that the State Department has been apprised of the difficulty encountered by the U.S. oil mission, as it is known that at least one representative made a flying trip to Washington almost immediately after his return.

One of the oil refineries in flames at Balikpapan, Borneo, during the combined Australian and Royal Netherlands Indies Army's victorious advance

The unofficial reason given for lack of entry to American properties in this area is laid to the Allied military authority, which is under command of Britain's Lord Louis Mountbatten. The oil properties are not ready—whatever that means—for foreign owners to reenter, is the reported explanation given the U.S. oil mission. And it's meaning is largely political, according to well-informed sources outside of oil circles. The only explanation the Netherlands Chamber of Commerce, in New York, has to offer is that "the oil properties are still under military control." When it was pointed out that private interests in Europe were allowed to inspect oil properties there while "still under military control," a broad shrug of the shoulders was the only reply from one well-informed Netherlands official, who later said that "there may be some definite information shortly."

Meanwhile one historically minded source recalled that after World War 1 the American counsel at Batavia informed the U.S. State Department that the Netherlands Government planned to turn over certain Standard Oil Co. of New Jersey properties to the Royal Dutch Shell. It was only after the State Department intimated to the Netherlands Government that if this was done the Shell interests might encounter difficulty in the U.S. when planning further expansion, that the threatened policy was abandoned.

U. S. Interests in Dark

However, it is pointed out here that every possible effort is now being made by the Dutch to cooperate with the Allies and that the oil property exchange contemplated in the Dutch East Indies, after the first World War, will not be repeated. Still, it is a mystery as to why U.S. interests have been barred from examining the extent of damage suffered by their refineries and oil fields, and are thus in the dark as to future planning for reconstruction and operations.

Following the voluntary destruction of U.S. and Allied oil properties by the owners themselves, in the early days of this war, it has been generally known that the Japanese conquerors succeeded in restoring some of the properties and even drilled 140 new wells. But reliable informants state that the Japs were never able to produce more than 25 to 30 per cent of the 90,000 bbl. daily which

the two refineries at Semarang, Java, processed before the Japanese occupation. These two refineries belong to Bataafsche Petroleum Maatschappij (Batavia Petroleum Co.—Royal Dutch Shell interests) and Nederlandsche Koloniale Petroleum Maatschappij (Colonial Petroleum Co.—wholly owned Standard-Vacuum Oil Co. subsidiary.)

At Semarang, as at Tarakan, Balikpapan and Palembang, Netherlands Indies forces severely damaged the installations, including the pipe-line system, before the Japanese took possession. And although the Japanese installed considerable new equipment, particularly in the oil fields, they were unable even to maintain properly the equipment not wrecked by the Dutch. Moreover, it is known that the two refineries, which the Japanese operated as a unit, connecting them with a new bridge over the Kommering River, must in large part be reconstructed completely. But to exactly what extent, the companies no not yet know.

Restoration Following Schedule

The Netherlands Chamber of Commerce reports that the restoration of oil facilities at the Borneo centers of Tarakan and Balikpapan in proceeding according to the schedule set up last May and July when first Tarakan and then Balikpapan were liberated. Maintenance of the restoration schedule, however, is dependent on obtaining the necessary machinery and other materials. At both places the installations were largely destroyed by Netherlands Indies forces just before they fell to the Japs. Further damage was inflicted by Allied bombs and Japanese withdrawal tactics.

Explaining further, the Netherlands Chamber of Commerce says:

"The production and delivery of 'bunker oil' at Tarakan was resumed soon after the recovery of the island, which lies on Borneo's northeast coast and is increasing as fast as repairs are completed. Examination has revealed that one-third of the oil wells in the Pamusian area was not destroyed and about half of the new wells drilled by the Japs are in good condition.

"Crude oil production in Tarakan amounted to 807,821 long tons (approximately 5,654,747 bbl.) in 1940 and 698,284 long tons (approximately 4,887,988 bbl.) in 1941. The Bataafsche Petroleum Maatschappij continued drilling operations throughout 1940 because of the tremendous demand for oil but restricted production the following year due to shipping space limitations."

The oil situation in Boreno, also an area of operations of the Bataafsche Petroleum Maatschappij, can be called "reasonably hopeful," Netherlands officials report. The largest fields on Borneo are located at Sumarinda and at Balikpapan. Approximately 400 wells produced 9,476,000 bbl. of crude in 1940 from wells 1,500 to 3,300 ft. deep. The crudes from the different horizons in these fields vary greatly, resulting from light distillate to asphalt and dyestuff bases. Moreover, the benzene and gasoline is of such a high quality that reportedly it doesn't require a sulfurc-acid treatment before being marketed.

An oil field survey of Tarakan by Netherlands technicians, reportedly shows that more than half of the existing wells are almost immediately recoverable. The problems presented by the destruction of the wells and machinery are considerable, but the fact that the fields are shallow is more favorable for a quicker resumption of operations than will be found possible on Sumatra and the east coast of Borneo where oil pays are at greater depths.

While the Netherlands East Indies supplied only about 3 per cent of the world's oil output before the war, the release of this Jap-held territory was of double value to the Allies in the last few weeks of fighting for it deprived the Japs of much needed fuel and gave the Allies another land foothold.

Peacetime production in the Dutch East Indies totaled approximately 170,000 bbl. daily, and Sumatra produced more than 50 per cent of this. In the 3 years of Japanese occupation, the Japs are reported to have restored daily production to about 140,000 bbl. which represented 90 per cent of Nippon's supply.

But all this is history, muse the oil men whose companies retain the "nonaccessible" properties in the Dutch East Indies. And the main interest now les in when conditions—political conditions, at any rate—return to normal, for U.S. oil men are already planning a return inspection trip, though date remains uncertain.

Witnesses Bolster States' Claims to Submerged Lands at Hearing

WASHINGTON. — Overwhelming support of claims of the several states to submerged lands within and adjoining their borders was given by a parade of more than a score of witnesses appearing last week before the Senate judiciary committee at hearings on the resolution, already passed by the House, denying all federal claims to submerged lands.

Only three witnesses opposed the resolution. The first was Secretary of the Interior Harold L. Ickes, who asked that Congress take no action until the question is decided by the Supreme Court in a pending suit brought by the Department of Justice against the State of California to obtain title to oil lands off the coast near Los Angeles.

The other two witnesses were independent operators who had tried unsuccessfully to get federal leases to drill for oil off the California coast, Robert E. Lee Jordon of Washington and California, and E. J. Preston of Livingston, Mont. Jordon presented a brief contending that the ocean bed off California was ceded to the U. S. Government by Mexico before California became a state, thereby putting these particular lands in a different category from other submerged areas.

With the exception of these two independents, no other representatives of any oil interests took any part in the hearings on either side of the controversy. All the supporters of the resolution were officials of states, cities, and other public bodies, including the American Association of Port Authorities, the Maritime Association of New York, and the National Institute of Law Enforcement Officers. One of the chief witnesses was the attorney general of California, Robert W. Kenny, but others represented Atlantic, Gulf, Great Lakes, and inland states. All contended that since the adoption of the Constitution the states have without question exercised jurisdiction over submerged lands without distinction as to whether these were under lakes, rivers, harbors, or the open ocean out to the international limit. Most of them said they had no interest in oil but if Congress or the Supreme Court asserts federal claim to submerged oil lands in the open ocean it will invalidate or at least cloud the title to all submerged lands now held by states or sold to others by states, including oyster beds, piers, docks, and filled-in lands which constitute important parts of many large cities.

Little attention was paid by the committee to Secretary Ickes' proposal that the resolution be amended to affirm state title to all submerged and reclaimed lands except the bed of the open ocean and to leave this question for determination by the Supreme Court, but most of the witnesses held that there can be no legal grounds for distinction in ownership of different categories of submerged lands.

Prof. Manly O. Hudson of Harvard University, former judge of the International Court of Justice, appearing as special counsel for the State of

California, submitted a careful legal argument in defense of state ownership. He admitted that no Supreme Court case bears directly on the question of title to the ocean bed below the low-tide mark, but declared that it is well settled that other submerged lands are state property and there are no decisions indicating that the ocean bed would be considered in a different class from other such lands.

Supporters of the resolution were pleased with the fact that the State of Washington joined with the attorneys general of 46 other states in endorsing the legislation. Ickes had made much of the point that one coastal state was not objecting to the claim of the federal Government. It was explained that at the time the attorneys general prepared their case the attorney general of Washington was in the military service, causing the state to delay formal action. Only Arizona has not participated in the demand that Congress quiet state titles to submerged lands by legislation denying federal claims. Should the resolution become law, it presumably would nullify the government suit now pending in the Supreme Court.

Navy Turns Back Four Refineries As Wage-Settlement Pace Quickens

THE oil industry this week looked forward to the complete return of the facilities which have been operated by the Navy since they were seized on presidential order last October.

Four major refineries — plants of Socony-Vacuum Oil Co., Inc. at East Chicago, The Texas Co. at Port Arthur, Phillips Petroleum Co. at Okmulgee, Okla., and Pure Oil Co. at Toledo — were returned to private management as settlements continued.

Latest tabulation showed the Navy still holds 24 refineries and three pipe lines which the Government took over to end the threat to the nation's petroleum - products supply last autumn.

Outside the oil industry itself, however, the labor outlook was less encouraging. Continued shutdowns in the steel and parts of the automobile industries were regarded as endangering equipment supplies if prolonged.

Ward's Automobile Reports showed the production of cars dropped to 23,785 vehicles last week from a previous week's total of 29,295. Observers believe the total may decline to 15,000, against a production of 100,000 new units weekly in a normal new model year.

In Dallas, a picket line was thrown around the Emsco Derrick & Equipment Co. when workers struck.

In the Houston steel strike, Reed Roller Bit Co. announced it had cancelled its union contract and issued a request to its employes to return to work. S. P. Farish, vice president of the company, said a non-strike clause in the collective bargaining agreement with the union was the basis for the cancellation and cited the provision as follows: "The union agrees that there shall be no strike or shutdown of production authorized by the union during the term hereof, and the company agrees that there shall be no lockout of employes during the term hereof. Breach by either party of this provision shall give the other party the right to terminate this agreement after 3 days' written notice."

Hughes Tool Co., also involved in the Houston phase of the nationwide steelworkers' strike, declared the second shift which it inaugurated last week is a success. The union, declaring the number of workers returning to the plant is exaggerated, widened picket lines to include two oxygen companies supplying Hughes.

Early Results Satisfactory

"The result of the first 2 weeks of actual manufacturing of Hughes products has been gratifying," Noah Dietrich, executive vice president, said last week. "We have supplied the trade with almost 50 per cent of our orders from the production line and the daily increases of workers returning will boost that figure by the end of the week."

Settlement of the Socony-Vacuum, Phillips, Pure, and Texas disputes followed the pattern for previous agreements leading to return of seized refineries. An 18 per cent wage raise was provided with shift differentials of 4 and 6 cents.

The Phillips contract provides for return to the 40-hour week February 24 with the wage increase effective at that time. The Texas Co. agreement covering about 4,000 operating employes at Port Arthur stipulates increases on resumption of the 40-hour week about March 1.

The group of naval officers sent out from Washington several weeks ago to push settlements was meeting in Chicago with officials of Cities Service Oil Co. and union officials. With the wage issue standardized at 18 per cent, side issues were reported to be the main point of contention.

Reports early this week in Chicago indicated Shell Oil Co.'s pipe lines will be one of the next properties to be returned to private management. Only a few minor issues were said to remain unsettled.

Last week's earlier settlements included Pan American Refinery Co. with a contract covering 1,250 workers in the Texas City plant. The 18 per cent raise becomes effective February 18 when the refinery resumes a 40-hour week.

A. F. of L. unions chalked up one defeat and one victory in other oil industry labor developments. In a National Labor Relations Board election, employes of Coastal Refineries, Inc., Taylor, Tex., voted 26-15 against representation by the International Union of Operating Engineers. Another NLRB election, of which results were announced in Washington, brought certification of the International Brotherhood of Boilermakers, Iron Shipbuilders and Helpers as bargaining agent for refinery boilermakers and welders at Mid-Continent Petroleum Corp.'s Tulsa plant.

Russell to Describe German Wartime Technical Methods

NEW YORK. — Technical developments made in German synthetic oil and chemical industries during the war will be described by R. P. Russell, president of Standard Oil Development Co., before chemical engineers in New York City February 28.

Russell, who was in Germany as head of the chemical, oil and rubber division of the U. S. Strategic Bombing Survey, will speak at the first postwar student banquet of the Junior Chemical Engineers of New York. Members of the American Institute of Chemical Engineers who will be in New York for a regional meeting also are expected at the banquet.

Price Ceilings Placed On Texas Sweet Crude

FORT WORTH.—Sweet crude from four West Texas pools has been placed under price ceilings as a result of its segregation from sour crude with which it formerly was marketed as a mixed product.

In its order the Office of Price Administration extended to the four pools ceiling prices generally applicable in West Texas for sweet crude. They range from 83 cents to $1.25 a barrel, depending on gravity. Mixed and sour crude ceilings are 13 cents lower. The four pools are Monahans-Ellenburger, Wheeler - Ellenburger, TXL-Ellenburger, and Bedford-Ellenburger.

THIS WEEK

POLITICS—Pauley nomination precipitates bitterest political fight in recent years. . . . Truman continues support. . . . Chances for committee approval considered no better than 50-50. . . . ¶OPA Chief Bowles apparently gaining White House support. . . . His theories seem to be winning out, dimming prospects for price relief, except in cases of dire hardship. . . . ¶Ralph K. Davies, deputy petroleum administrator, considered for Ickes' successor as Secretary of Interior. . . . Clash between Ickes and administration over Pauley may hasten shift in cabinet. . . . ¶Committee completes tideland hearings. . . . Executive session to determine next move in Congress. . . .

NATURAL GAS—Texas operators complete impressive record before FPC, opposing imposition of federal regulation on production, gathering and sale of gas. . . . ¶Mississippi officials register strong objection to FPC authority over end use. . . . ¶WEP lines reportedly may be sold to gas companies since oil transporters have made no bids. . . . Congressional resolution provides for extending study period 30 days. . . .

LABOR—Approximately half of the industry's seized plants returned to private management. . . . Navy striving to expedite release of facilities by negotiating settlement of disputed points. . . . ¶Steel strikes reduce supplies of certain equipment items. . . . Supply companies stretching available stocks by voluntary rationing. . . . Consumers cooperating by taking delivery only on immediate requirements. . . . ¶Houston bit manufacturer resumes operations after canceling CIO contract. . . . Claims strike violated union agreement and, therefore, relieved management of contract obligation. . . . ¶Tugboat strike in New York area forces drastic rationing of fuel oil. . . . Most office buildings cold and tenants stay home. . . .

FOREIGN—Arabian American Oil Co. starting crude runs from Abqaiq field through new 40-mile 12-in. line to Dhahran. . . . Ras Tanura refinery, designed to handle 50,000 bbl. daily, running 80,000. . . . ¶Oil discovery in Nicaragua denied by operating companies. . . . ¶Kuwait oil shipments to start within 90 days. . . . ¶Colombia offering to concession limits unchanged, if companies will assume higher tax rates, increase exploration. . . . ¶Venezuelan operators reassured by formal statement from Revolutionary President Betancourt. . . .

MARKETS—Gasoline market unsettled. . . . Spread increasing between low and high quotations. . . . ¶More than 1 million barrels added to motor-fuel stocks. . . . ¶Industry anxious to see greater flow of new cars, end of strikes and resumption of normal travel. . . . ¶Distillate and residual fuels continue declines. . . . ¶Refinery operations off slightly but increased production pushes crude stocks upward. . . . ¶Natural gasoline market weakened early in week but recovered before many sales were consummated. . . .

DRILLING—Well completions at 507 for week remain above 1945 activity. . . . Wildcat drilling turns up for week but is generally slightly under last year's rate. . . . ¶More idle rigs threatened unless steel strike is settled. . . .

The townsite drilling boom in the little municipality of Cement (pop. 1,039) in southwestern Oklahoma has heavy rotaries checkerboarded among old and shallow production. The ancient wooden-rig front in center foreiront was one of the installations that came with the 1917 discovery. The small individual unit at left was put in much later for other shallow development. Now, H. W. Snowden and associates have 15 rigs active on 5,000-ft. and deeper drilling, in a projected 100-well campaign. While the present rushed and crowded conditions are reminiscent of many other former townsite drilling plays, the platted parcels at Cement are unitized with 40-acre divisions, and completion locations are staggered as to any one of a dozen different pays

Bailey Tells FPC Mississippi Opposes Natural-Gas Restrictions

BILOXI. — Mississippi strongly opposes any restrictions over the exportation or end use of natural gas, the Federal Power Commission was told February 11 as it opened its natural gas investigation hearings here.

This was the position of Gov. Thomas L. Bailey of Mississippi, whose statement was read into the record by William Fontaine, assistant attorney general of the state.

The policy statement of Governor Bailey emphasized that Mississippi wants no federal interference with its constitutional function of controlling production or gathering of natural gas within the state borders. It follows the sentiments expressed by state officials of all other producing states in the Southwest and South sections, except Louisiana, which opposes the exportation of its gas.

"I wonder," suggests Governor Bailey's statement, "if your difficulties would not be lessened and the public interest served best if the Natural Gas Act were amended so as to make it clear that your jurisdiction does not include any phase of producing and gathering operations, field prices, or end use?"

He said it is his idea that "we would be willing to sell gas to the other states in the Union, as from all the present indications we will have ample quantities for ourselves and to sell a good long time to come," adding that he is informed Mississippi has an already proved reserve containing sufficient supplies to serve the state for 793 years at the present rate of consumption.

"I do not think it wise to delegate to any administrative agency the power to determine what is the better use of any energy resource today, tomorrow, 1 year or 10 years hence," the Mississippi official declared, pointing out the possibility of the use of atomic power within the near future.

"It is inevitable," he added, that end-use control cannot be limited to natural gas and coal. They are both competitive with water power, oil, electricity, wind power, and all other sources of energy. Therefore, any measure of control over the use of any single one of the many sources of energy will inevitably lead to control of all.

"It seems to me that it will be quite difficult, if not impossible, to stimulate prices for any commodity under our free competitive system and, at the same time, restrict the use of the commodity."

He urged that "competition under the watchful eye of the states be the arbiter for determining end-use."

The hearing is expected to end by tomorrow evening, since the only other witnesses scheduled are: Atty. Gen. Greek Rice, who will discuss legal aspects of the problems involved, and W. M. Vaughey, independent producer, who will give the viewpoint of industry men in the state, and H. M. Morse, state superintendent of the Mississippi Oil and Gas Board, slated to give facts concerning the state's known reserves and potentials.

It will be pointed out during the Mississippi presentation that the state now has slightly less than 1 trillion cubic feet of known reserves of natural gas; that it has had five new oil and gas fields discovered in 1945 and 9,000,000 acres under lease waiting for steel with which to drill wildcats, and that therefore the present known reserve is undoubtedly expected to increase substantially.

Texas' Position on Gas Is Clarified As Houston Hearing Ends

by Charles J. Deegan

HOUSTON.—As the Federal Power Commission closed almost 2 weeks of hearings on the natural-gas situation here, and moved on to Biloxi, Miss., the whole picture presented by Texas could be seen in perspective.

First and foremost, it was apparent that Texans were deadly serious about the potential threat to their rights that is implied in the commission's recent activities and decisions. No less than six state officials, all holding elective offices and responsible to the voters in statewide elections, testified and told the federal agents in no uncertain terms where, in their opinion, the authority of the federal Government should stop because any further extension would interfere with the rights of the people of Texas. In their separate ways, each one warned the federal Government representatives, courteously but firmly, that Texas would not tolerate any encroachment on its rights in a matter so vitally connected with the economic welfare and natural resources of the state. If necessary, they said they would seek to have Congress amend the Natural Gas Act so that the authority of Federal Power Commission would be explicitly limited to the sphere in which the state of Texas claimed no authority.

The officials who testified in this vein were the governor, the attorney general, the three railroad commissioners, and the state superintendent of public instruction.

In addition, both public officials and private individuals, notably among the latter, Col. George A. Hill, Jr., expounded the philosophy and passionate belief of Texans in the merits of free and competitive enterprise in the development of the state's natural resources, subject only to the minimum regulation and control deemed advisable by the state legislature and state administrative officials, all of whom must answer to the citizens of Texas in periodic elections. They pointed out that the ultimate destination of unchecked federal regulation was exactly the same goal reached in totalitarian states.

It was obvious that members of FPC were somewhat taken aback by the ferocity of the Texans' attack on some of their recent decisions, and what the Texans foresaw as the ultimate end result. Commissioner Harrington Wimberly, a recent appointee to the commission, objected to such a forecast by Colonel Hill, stating that he would object to the commission's seeking such powers just as much as the colonel, and that to his knowledge, there was no such intent on the part of the commission.

Having made their points on questions of states' rights and powers of regulation, the Texans then proceeded to put a long list of technical witnesses on the stand and give the Commission a thorough education in the history of natural gas in Texas, its early struggle for existence, the search for markets, and the gradual evolution of the state's conservation measures.

Clarifying the question of flared casinghead gas, the Texans made it clear that through their own efforts, they had achieved a situation that as of 1946 stood as follows:

1. There is absolutely no waste, physical or economic, of natural gas from dry natural-gas fields.

2. Casinghead gas, produced from

oil wells, poses an entirely different problem for several reasons. First, its primary function is, and must always be, that of making it possible to recover oil from the underground reservoir. Any use, or control, must be on the basis of its status as a byproduct that has already performed its major function.

3. Treating the problem on that basis, Texas has made substantial progress in recapturing the economic values potentially available in the casinghead gas. Progress along these lines was set back by the war for two reasons; first, that increased oil production had necessarily increased the volume of casinghead gas, while second, shortage of materials during the war had made it impossible to put into effect plans to conserve large quantities of this gas.

Rumors of substantial differences of opinion among Texans, particularly some of the state officials, about exports of gas, turned out to be greatly exaggerated when they testified. It was apparent that all Texans, as well as state officials, were dissatisfied with the well-head price of gas. They deemed it far below its intrinsic and competitive value as a fuel. However, the main differences of opinion were rather minor, in that some officials merely wanted to be assured that there was plenty of gas for Texas industry, and that this reserve supply would not be endangered by exports. All were opposed to any attempt by FPC to influence artificially the price of gas, preferring to leave that to the natural competitive play of the market. All joined in pointing out the fallacy of the commission's recent order in the Canadian River case, which in effect disallowed the pipe-line company the going market value of gas produced from its own properties. This had the effect of depriving a property owner of the enhanced value of his property resulting from the discovery and development of gas production on it.

From the standpoint of conservation, Texas' case was summed up as a question of whether gas conservation in the state is static, is going backward, or is being capably and efficiently handled now and improving steadily at a satisfactory rate. That was the way it was put to the federal representatives by Stuart E. Buckley, head of production research for Humble Oil & Refining Co.

His own testimony, and that of all other witnesses, demonstrated clearly that state regulation is currently capable and efficient. Furthermore, far from being satisfied with what they have already accomplished, the state authorities and industry, working together, have definite and far-reaching plans for recapturing economic values from vented casinghead gas.

On the problem of controlling "end use" of gas, that is, what kind of markets gas might seek at the delivery end of interstate pipe lines, the Texans unanimously invoked their own firm convictions on the right of the individual to have his own choice of the kind of fuel he wished to buy, and the right of individuals owning gas to compete for buyers anywhere. They insisted that economic democracy for the citizens of other states implied the right of those citizens to vote with their dollars for the kind of fuel they wished to consume, and the right of Texans or anyone else to take the risk of carrying natural gas to those markets and competing for customers, in the hope of making a profit by so doing.

Texas wants a higher well-head price for natural gas, whether its source is dry gas fields or casinghead gas, but neither public officials nor private industry representatives were willing to compromise their principles and philosophy of freedom and initiative to accomplish this by federal Government intervention. They ask only free access to competitive fuel markets and are willing to take their chances that competition in a free market will give them what they ask for in the way of higher prices.

Efforts of attorneys representing railroad and coal interests, both corporations and labor unions, to confuse the issues aroused only fierce resentment. From opinions expressed, it is obvious that when hearings are held in Washington, Texas officials will try to force the appearance of railroad and coal officials in order to subject them to crossexamination, designed to expose their motives in attempting to shut out competition in a competitive market with Texas gas.

Immediate Gasoline Market Firm But Strikes Make Future Uncertain

by Dahl M. Duff

MIDWESTERN markets in refinery gasoline this week appeared to be holding firm to the lower level reached at the end of January after a ⅛-cent drop.

Although the long-range outlook is not encouraging, marketing experts looked for no further cuts in prices in the near future. Price of regular at major refineries stood at 5⅜ cents, while some smaller suppliers were quoting the product as low as 4½ cents.

Unless automobile and steel strikes are settled in the near future and production gets into high gear, consumption of gasoline this summer will depress the gasoline market further.

The virtual shutdown of production in the face of the General Motors and the steel industry strikes threaten serious effects. Reports this week were that automobile production which normally averages 100,000 units weekly in a new model year have shrunk to below 15,000 vehicles. Oil men had been looking toward the first postwar traveling summer to relieve high gasoline stocks.

General Motors has not produced a single car or truck since November 21. All Ford output was due to be halted late last week with the closing of five more plants because of the steel strike. Automobile production in the week ending February 2 was 29,295 units, half of them from Ford.

The Oklahoma Group 3 natural gasoline market fluctuated sharply early this week, at first dropping to 3¼-3½ cents for the 26-70 grade and then rising back to 3.5 cents. Withdrawal of the low of this quotation was announced too late for inclusion in the table of market quotations carried on the "Statistics and Trends" pages, 144-145. Latest figure for 18-55 grade was 4.2 cents.

Foreign buyers contracted for sizeable quantities of natural gasoline off the Gulf Coast for export, particularly to Europe. These orders imparted a steadier tone to the market generally.

After an earlier drop of ½ cent about 10 days ago, natural gasoline producers contended that another cut would reach a marginal point where it would be more advantageous to store, rather than sell. Natural gasoline storage normally begins during the spring with the seasonal slack in sales to refiners requiring less of the volatile product for summer motor fuel. Storage of natural gasoline at this time is considered abnormal.

In the more important gasoline market, however, statistics for the week ending February 2 showed a continuation of overproduction of gasoline and underproduction of burning oils. Government officials are hoping the recent raise in burning oil prices will cause refiners to change yields to meet the critical shortage of burning oil.

February 2 A.P.I. figures listed the increase in stocks of finished and unfinished gasoline at 1,098,000 bbl. New total is 102,835,000 bbl., compared to 92,141,000 bbl. a year previously. Light fuel-oil production declined to 5,636,000 bbl. for the week from 5,720,000 the preceding week. Gas oil

and distillate stocks were down to a total of 28,939,000 bbl.; residual stocks dropped to 39,086,000 bbl.

It apparently is too early for the effect of the price rise in burning oils and the drop in gasoline to be reflected in the weekly compilation. One market analyst was doubtful of any substantial change in yields. He pointed out gasoline is at 5.375 cents for regular, excluding 0.3 cent for the leading compound. With burning oils at 5 cents, he feels the spread still exists to discourage any wholesale change in crude breakdown. Small refiners, whose product is selling below 5 cents, are finding it profitable to increase kerosene, he added.

Gasoline sellers were watching reports of storms and cold weather from north central United States for any possible unfavorable market influences. While the market was steady, considerable declines in consumption could cause further drops.

Following the action taken by Standard Oil Co. of Indiana in reducing its gasoline prices two weeks ago, Socony-Vacuum Oil Co. late last week announced cuts ranging to 0.3 cent in New York and New England except in areas where prices already were subnormal.

Such a move was a "must," a source other than Socony pointed out, since regular gasoline can be bought for as low as 7.425 cents per gallon, and some sources quoting even lower in these areas. The high for regular remains at 7.9.

Standard Oil Co. (N. J.) said that Socony's reduction will be met, and indications from other suppliers were that they too would make similar reductions.

With the New York harbor barge and tugboat strike in a critical stage, at week's end—though prospects for an early settlement are good—the No. 2 fuel oil supply remained tight, but even a strike settlement is not expected to help much. The residual oil situation is even worse. One source stated, "I don't see how we will get through the winter with the current residual oil outlook."

Meanwhile, reports from Montreal stated that a 2 cents per gallon hike, effective March 18, will be made in Canada, on all grades of gasoline, tractor distillate, kerosene, and lighting naphtha. Reduction in subsidies paid on imported crude at the beginning of this year increased the cost of imported crude to the refineries by 45 cents per barrel.

Pauley Nomination Major Political Issue; Has Truman's Confidence

by Henry D. Ralph

WASHINGTON. — The nomination of Edwin W. Pauley as Undersecretary of the Navy has become a major political issue, with his confirmation by the Senate still a matter of uncertainty.

Hearings on his confirmation were suspended by the Senate naval affairs committee the middle of last week with the prospect that the nominee would again be called to answer charges against him and that additional witnesses might be present to discuss his past business and political actions.

The California oil operator and former treasurer of the Democratic National Committee stood accused of having mixed his business interests and political position in a way which many members of the committee thought made him unsuited for the high Navy post where he would have to make many policy decisions regarding oil.

When the hearings recessed it appeared that both the committee and the Senate membership were about evenly divided on confirming or rejecting Pauley's nomination, but the next day President Truman told a press conference that he is still backing Pauley and would not withdraw the nomination.

The president said he considers Pauley an honest man, not the only honest man in Washington or in the oil business, and that he has utmost confidence in him. He said Pauley is a capable administrator and did an excellent job as head of the American delegation on the reparations commission.

Asked about the testimony of Secretary of the Interior Harold L. Ickes that Pauley had used political pressure to stop the federal Government from pressing its claims to submerged oil lands off the California coast, the president said that Ickes could be mistaken. Although the cabinet officer is attempting to block the confirmation of one of his appointees, the president said this would not make any change in his relations with Ickes.

This caused an unprecedented political situation which is the basis of much speculation in Washington. The president's personal supporters in and out of Congress will be expected to exert all efforts to secure confirmation of the appointment on which Truman insists. Yet most of these strong personal supporters are in the so-called liberal wing of the administration who have a political allergy against business men and particularly oil men. Furthermore, Ickes has always been closely allied with this group. Remembering Teapot Dome and other oil scandals of the past, many Democratic senators have already expressed the opinion that it would hurt the party to confirm any oil man to a post dealing with Naval petroleum reserves, particularly an oil man against whom a suggestion of impropriety had been raised justly or unjustly.

This situation made it impossible to predict the outcome of the final vote on confirmation, particularly until the Naval affairs committee had concluded hearings and made a report. It also decreased the likelihood of other oil men being nominated to high government posts.

The high point of last week's hearings was Ickes' second appearance at which he produced documentary evidence, in the form of entries in his own diary, to support his earlier charge that Pauley had tried to induce him to drop the Government's claim to submerged oil lands on the promise that such action would result in large campaign contributions from California oil men. One of these occasions, Ickes testified, was on President Truman's official train returning from the burial services of President Roosevelt. Ickes said he wrote at the time:

"This is the rawest proposition that has ever been made to me. I don't intend to smear my record on oil at this stage of the game."

Another sensation was the second appearance of Max W. Thornburg, formerly petroleum adviser to the Secretary of State, who told the committee that Pauley tried to get the State Department to approve sale of an oil tanker to Mexico by offering to donate his $6,000 commission to the Democratic campaign fund.

Pauley broke in and denounced Thornburg's charge as a "dirty, deliberate lie."

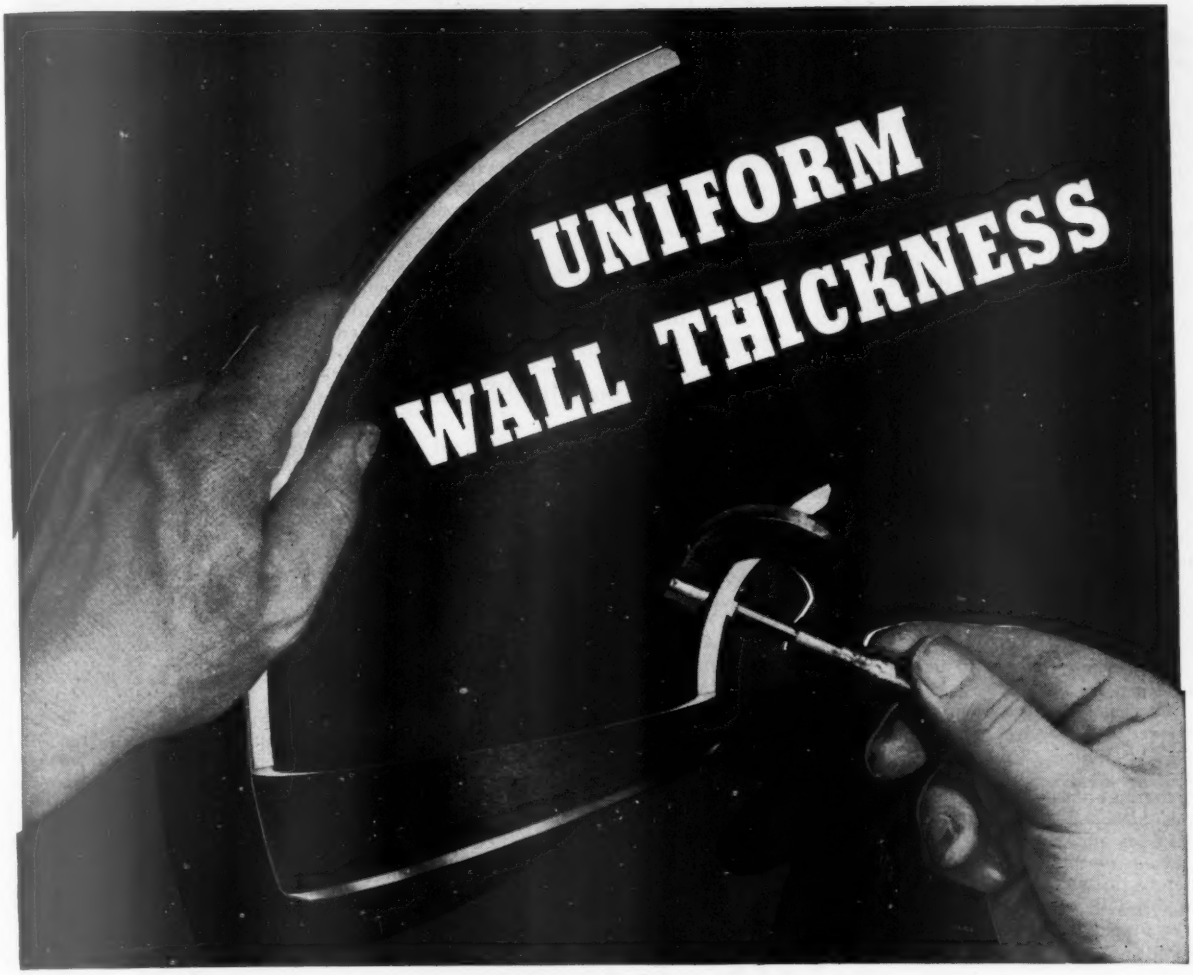
The hearings developed a wide assortment of facts and charges, few of them bearing on Pauley's qualifications for the Navy post. Among other things it developed that:

Ickes and Pauley don't like each other;

Pauley and Thornburg don't like each other;

Thornburg and Ickes don't like each other;

Thornburg and Deputy Petroleum Administer Ralph K. Davies, though both formerly connected with Stand-



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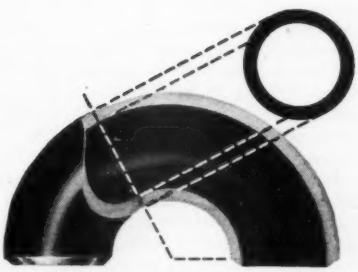

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ard Oil Co. of California and affiliated companies, aren't exactly pals.

The relationship between Pauley and Davies is far from close although Davies' company bought certain of Pauley's interests and Pauley claims to have been responsible for Davies' government appointment.

Another interesting sidelight on internal administration affairs was the revelation that Ickes declined to make a requested $1,000 contribution to the Democratic campaign fund because, he said, National Chairman Edward J. Flynn had prevented him from making a campaign speech in Portland, Ore. Flynn, who happened to be in Washington on other business, told reporters the speech was not made because no local Democratic group would sponsor a meeting for Ickes to address. Flynn added that Ickes was always asking President Roosevelt for nation-wide radio hookups but the president and campaign managers did not consider Ickes' speeches worth such expense. Ickes told the committee he later contributed $500 after learning that Pauley was meeting the party deficit out of his own pocket.

Ickes also let the committee understand that Pauley was responsible for the failure of the Department of Justice to file suit for title to California submerged oil lands until after the death of President Roosevelt. He said he and the Department of Justice wanted to bring the suit long before it was filed but that Pauley opposed it, and Pauley had access to the president, and the suit was not filed.

I.P.A.A. Renews Fight On Oil-Price Ceilings

WASHINGTON.—Another attempt to secure removal of crude oil price ceilings is being made by the Independent Petroleum Association of America, this time bypassing the Office of Price Administration and appealing directly to John W. Snyder, director of the Office of War Mobilization and Reconversion.

B. A. Hardey of Shreveport, president of I.P.A.A., called attention to a statement in Snyder's recent quarterly report which promised that price ceilings on various commodities would be removed as quickly as supply approaches balance with demand, and called on Snyder to "take the controls off an industry that is in a position to furnish all the requirements of the consuming public."

"Since the war ended our supply does exceed demand and no shortage of oil is probable in the foreseeable future," Hardey declared. "If price controls are continued, however, shortages might eventually be brought about. The oil producers must be encouraged to search diligently for new fields. Such diligent search cannot be conducted unless a reasonable increase in crude-oil price is made."

For some weeks Snyder and other high government officials have been working on a new wage and price-stabilization policy, and announcement was expected momentarily. There was a possibility that the new policy might open the way for somewhat higher petroleum prices, although it was generally expected that price increases would be confined to industries showing the need for higher prices to absorb recent wage increases.

Committee Finds Justification For Price Increase

WASHINGTON. — A finding that the cost of developing and producing crude oil justifies an increase in the price ceiling was made to Office of Price Administration Monday by the National Crude Oil Industry Advisory Committee.

The OPA announced that the report would not be released until it has been studied but that an answer would be made in not less than 3 weeks. While the exact nature of the report was not revealed, Charles F. Roeser of Fort Worth, chairman of the committee, urged OPA to give immediate consideration to its findings and recommendations, which indicates that the committee recommends a higher price.

The advisory committee was appointed by OPA January 3, 1945, following pleas from producers that current costs of production warrant a higher price as provided by the price-control law. An extensive cost survey was conducted by OPA and the collected data were turned over to the committee for analysis November 27.

Well-Logging Methods Subject of Conference

A conference on well-logging methods, sponsored by the Petroleum Engineering Department, will be held in the Petroleum Engineering Building at Texas A. and M. College, College Station, Tex., from March 11, at 1:30 p.m., through March 15, at 5:00 p.m. This conference will cover all types of well logging.

Hubert Guyod, well logging consultant and graduate of the School of Mines, St. Etienne, France, will lead the conference. Guyod served as chief engineer for Schlumberger from 1935 through 1940, and as research engineer for Halliburton from 1940 through 1945.

The Halliburton Oil & Cementing Co., Baroid Sales Co., Lane-Wells Co., Schlumberger Well Cementing Corp., Horvitz Laboratories, and Dowell Co. are cooperating, and will give field demonstrations.

Halpern and Saunders Made Texas Co. Directors

NEW YORK.—Two new directors of The Texas Co., Michael Halpern and Richard L. Saunders, have been named.

Halpern is vice president in charge of refining and Saunders is vice president in charge of domestic sales. Halpern joined the company in 1916 as an assistant civil engineer at the Bayonne terminal, while Saunders started in 1909 as a voucher clerk in the New York office.

Halpern was born in New York City in 1892 and was graduated from

M. HALPERN

R. C. SAUNDERS

New York University with a degree in civil engineering. Entering the service of The Texas Co. he worked in various positions in the refining department, first in the terminal division and later at several of the company's refineries. In 1930 he was made assistant manager of the department and director of research. In 1937 he was appointed manager of manufacturing and in 1938 became general manager. He was elected a vice president in September 1940.

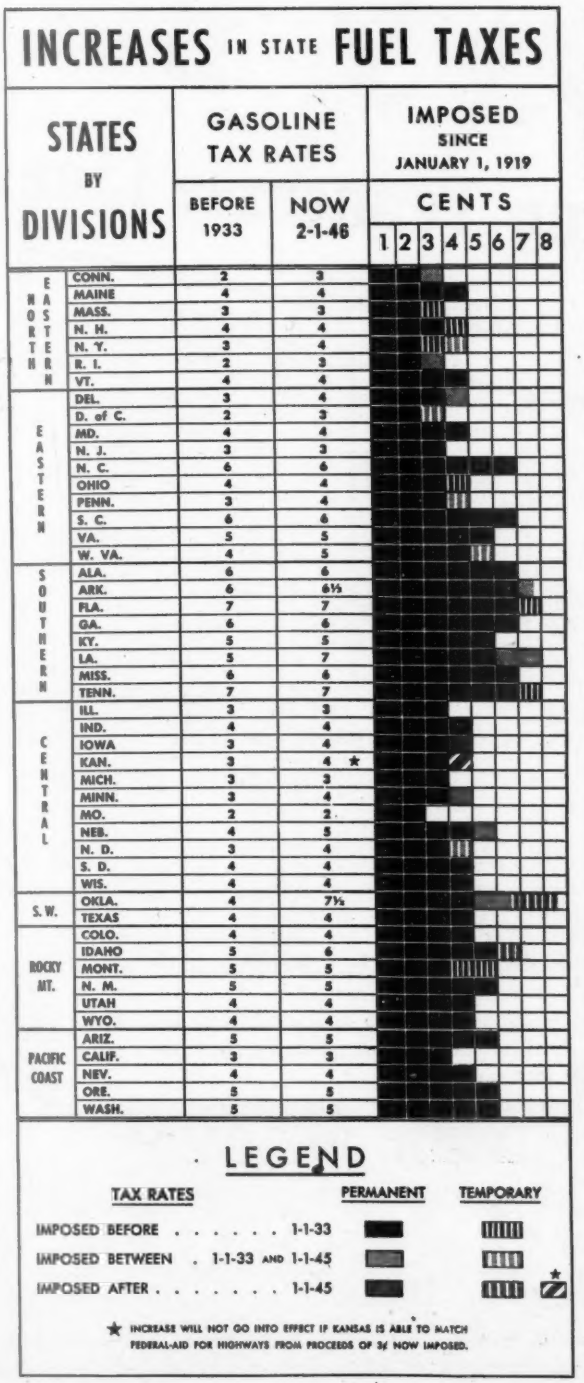
Saunders, born in Jersey City in 1892, attended Jersey City high school. His first and only employer has been The Texas Co. From 1909 to 1935 he held many positions in the domestic sales department, advancing to assistant general sales manager. In 1938, he was elected secretary of the company, and in 1944 was elected vice president and secretary. He resigned as secretary in August 1945 to become vice president in charge of domestic sales.

PIWC Vote Warrants More Study on Continuance

NEW YORK. — With seven Petroleum Industry War Council members still to cast votes on whether to establish a peacetime counterpart, indications here are that while the required 75 per cent may not be attained to accomplish this, it will be close enough to warrant calling another meeting to discuss plans. Industry feeling is still strong that government should ask for advisory group rather than industry organizing itself. The score on votes, as of February 11, was 45 yes, 22 no, and 2 noncommittal.

Industry Warned of Evils of Gasoline-Tax Diversions

by Warren W. Burns



NEW YORK.—Gasoline taxes are producing an ever-increasing proportion of funds needed for highway construction and maintenance. Because of this, members of the oil industry are being urged, by well-informed tax sources, to prevent the continuance of many so-called evils which lead to the diversion of gasoline tax funds—funds ostensibly collected for highway construction and maintenance.

Indicative of the need to maintain a close watch over state gasoline tax funds, and to enact further legislation to plug up existing methods of diverting this type of taxation, is the fact that the relatively new federal highway act authorizes the expenditure of $1,500,000,000 provided that the states match this federal aid. And while the sum is huge, on its face value, it's generally believed that the states can match it if effective means are employed to prevent gasoline-tax diversion.

Moreover, unless the various state legislators take the necessary steps to prevent further diversion, chances are that gasoline taxes will reach new heights in the postwar years. The Federal-Aid Highway Act of 1944 provides for expenditure of $500,000,000 a year for the first three postwar years, to be matched by the states on a 50-50 basis. This authorization is generally referred to as a 3-year program, but both federal and state officials recognize that the planning, acquisition of rights-of-way and completion of such a program probably will take more than 3 years.

Official spokesmen in some states have indicated that motor vehicle tax increases, with particular emphasis on gasoline taxes, will be advocated to provide funds for matching federal aid under this program.

Commenting on this situation, the American Petroleum Industries Committee points out, in its latest issue of the "Tax Economics Bulletin":

"In view of the problem now facing the states of providing funds to match the large federal allotments for postwar highway construction under the new federal-aid measure, it is highly desirable that they reexamine their gasoline tax administration policies to the end that all users of the highways will contribute their just share of the cost of highways. Only when this is accomplished will the states collect the full amount of highway revenues from existing tax sources to which they are entitled."

In a recent issue of the "Road Builders' News," published by the American Road Builders Association, Charles M. Upham, engineer-director, terms gasoline-tax diversion as "a highway robber," explaining that 18 states have passed constitutional amendments against the practice but only 15 states out of the 48 did not use some part of the highway fund for something else.

"What becomes of the huge highway funds?" Upham asks. He then explains that while the taxes are levied for highway construction and maintenance, a large number of the states raid these funds for other purposes, which so often are not even remotely connected with the construction or maintenance of roads. And while these raids on highway taxes by "state house plunderbunds"

WAR-CLOSED STATIONS NOT REOPENING

NEW YORK.—Not many of the thousands of gasoline service stations closed down during the war have reopened. Oil-company officials agree on this development and advance several reasons. Many of the stations were marginal or submarginal in the first place. Shortages of pumps, building material, and labor also have discouraged reopenings. The nation's 233,958 stations in 1941 had declined to 182,258 in 1943, last year for which figures are available.

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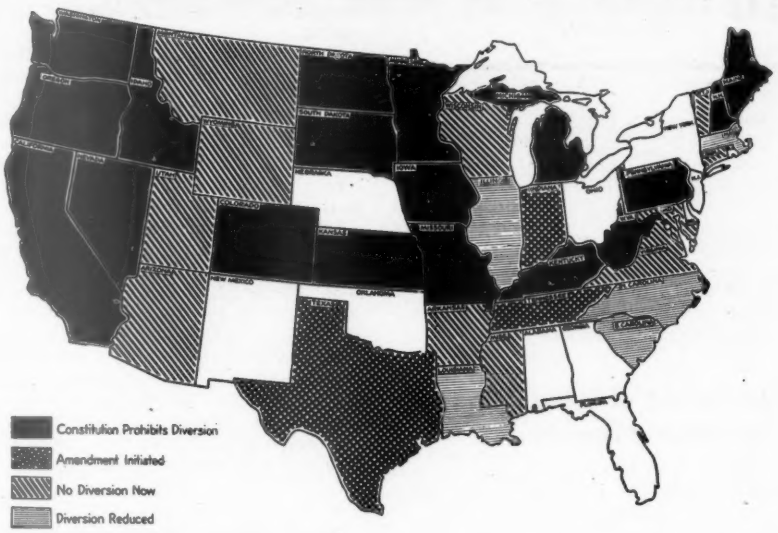
PROGRESS IN PROTECTING HIGHWAY TAX FUNDS



are being halted in some few cases, it's expected that years will elapse before tax diversion is completely eliminated.

How Highway Users Lose Out

Indicative of how highway users lose out from gasoline-tax diversion is the fact that in 1941 only 193 miles of state highways were constructed in New York, while highway revenues were sufficiently high to provide for an additional 340 miles. And New York's case is not an isolated example as this situation has its counterpart in practically every other state, and its interest to oil men is the fact that unless means are taken to halt these practices, gasoline taxes are slated to reach higher levels.

During the past year, four states—Kansas, Iowa, Idaho, and Oklahoma—increased the tax on gasoline, increases which could have been avoided, competent tax authorities point out, except for the combined factors of diversion and a refusal of other interests to assume their fair share of taxation.

If current trends to "soak the drivers" continue, in so far as piling more taxes on gasoline are concerned, it's believed by some economists that the "point of diminishing returns" for this type of revenue, may be reached.

Moreover, difficulty in matching federal highway aid will no doubt prompt legislators to consider gasoline-tax increases. This difficulty has already made intself apparent in Louisiana and Mississippi where bills to increase the rate may be expected.

The gargantuan postwar highway program projected for Massachusetts is certain to make itself felt in the halls of the legislature where attempts to increase the gasoline tax by 1 or possibly 2 cents may be made. Proceeds realized from any increase reportedly will be available for distribution to cities and towns in order to bolster their revenues without increasing state property taxes.

In Virginia, an attempt was made in 1944 to increase the gasoline tax rate from 5 to 6 cents per gallon. A revival of this measure is expected in the current legislative session.

Definition of "Motor Fuel"

Improvement of the gasoline-tax administration is a definite objective in Mississippi with emphasis on the alleviation of hardships presently imposed with respect to barge shipments which are now subject to a tax at their points of origin rather than destination. Efforts to define "motor fuel" are under way in South Carolina to permit an allowance sufficient to cover the cost of collection of the tax instead of the 1 per cent now allowed.

In Massachusetts, a bill to declare operators of diesel engines to be distributors has been carried over from the 1945 session and will be considered again this year. In Mississippi the legislative investigating committee has recommended a reduction in the evaporation allowance from 2 to 1 per cent. A move to obtain agricultural refunds which failed in the Kentucky 1944 session will be revived in that state.

In regard to the proper administration and collection of gasoline taxes, it has been shown that approximately 60 per cent of all gasoline consumed in North Dakota, in 1944, was sold tax-free. Estimates in two other states for 1944 show that more than 40 per cent of the gasoline consumed in Kansas was tax-free and over 30 per cent of Oklahoma's gasoline also escaped taxation.

While the outright evasion of paying gasoline taxes is practically impossible to prove in the three states granting exemptions, it is known that millions of gallons of gasoline being used on the highways is being consumed tax-free. In fact the situation became so bad in North Dakota that a bond issue was recently floated for approximately $12,300,000 to match federal highway aid. Obviously this same deficiency accounts for the increased gasoline-tax rates in Kansas and Oklahoma.

In reviewing the gasoline-tax situation during 1945 and in looking ahead at the 1946 picture, officials in the petroleum industry are quick to admit that oil men should continue taking an active part in efforts to correct the evils which have become almost inherent in the highway financing of most of the states.

KANSAS BOOSTS TAX

TOPEKA. — Kansas gasoline tax has been boosted to a total of 4 cents a gallon, effective March 1. An additional 1-cent levy was authorized last year by the legislature. It was placed in effect by the governor after a Highway Commission resolution that more funds will be needed to match federal aid.

Herron and Pinckard Receive Promotions

NEW YORK.—Howard M. Herron, president of Bahrein Petroleum Co., Ltd., and of the California Texas Oil Co., Ltd., has been named board chairman and chairman of the executive committee of both companies.

H. M. HERRON

W. H. PINCKARD

William H. Pinckard, vice president and director of both companies, has been named president, succeeding Herron in both positions.

B. W. Letcher, San Francisco, has been elected a director of both companies and E. A. Beverly was named a vice president of Caltex. Letcher is a vice president and secretary of the Standard Oil Co. of California (partner with The Texas Co. in both companies), and Beverly formerly was assistant vice president of Caltex.

INTERNATIONAL

Crude Runs Start From Second Arabian Field

A 40-mile 12-in. pipe line having been completed, crude-oil deliveries from the Abqaiq field in Saudi Arabia to the Dhahran area where the main headquarters of the Arabian American Oil Co. (Standard Oil Co. of California and The Texas Co.) are located, will start immediately. Another 40-mile 12-in. line from Dhahran to the new Ras Tanura refinery paralleling the existing line is also being completed so that the Abqaiq field will be connected directly to the refinery.

In the past all of the marketed crude-oil output of Saudi Arabia has come from the discovery Dammam field located in the Dhahran area. The field has been producing approximately 95,000 bbl. daily part of the crude oil going to the Ras Tanura refinery and the remainder by a 34-mile pipe line to the refinery of the Bahrein Petroleum Co., Ltd., on Bahrein Island. This production was not sufficient to take care of the requirements of the two refineries which have been processing approximately 150,000 bbl. daily. The Ras Tanura refinery which was designed as a 50,000-bbl. refinery has been refining about 80,000 bbl. daily. The difference in crude-oil output of the Dammam field and the requirements of the two refineries has been supplied from storage.

Sand-Dune Area

The Abqaiq field is in a sand-dune area about 40 miles southwest of Dhahran which is close to the Persian Gulf. The discovery well of the field was completed in February 1941 at a depth of 6,180 ft. It is producing from what is known as the D member of the Arab zone. Five wells were completed in the field proving an area which is approximately 7 miles long and 3 miles wide. The field has not been defined in any direction and it is believed that the structure will prove to be one of the largest so far discovered in the Middle East. It is expected that the flow from the five wells and the Dammam field will furnish sufficient crude oil for the two refineries. Additional drilling is now under way in the Abqaiq field.

Operations over the past month have demonstrated that the Ras Tanura refinery will have a permanent processing capacity substantially in excess of the original design of 50,000 bbl. daily. The plant consists of two combination crude-oil distillation and vacuum units. The cracking operation consists of two units which can be operated with gas oil or with heavy naphthas for reforming.

The housing facilities for American staff and nationals are being steadily expanded in Saudi Arabia. Additional houses and other facilities are being built at Dhahran and work is under way for permanent housing at the Ras Tanura refinery.

Discovery of Oil in Nicaragua Denied

NEW YORK.—Reports from Nicaragua that oil has been discovered there are entirely unfounded according to a reliable source here, which early this week stated that while the American International Fuel & Petroleum Co. (Gulf Oil Corp. and Atlantic Refining Co.) are doing exploratory work there, it is all of a seismograph nature. In 1945 one deep hole was drilled for stratigraphic information.

Kuwait Oil Shipments to Start Within 90 Days

NEW YORK — Crude shipments from Kuwait's Burgan field are expected to commence some time next May, according to authoritative reports here. Previously, it had been expected that commercial production would start in March, but some difficulty was encountered in obtaining the necessary loading tanks and other construction equipment.

At present, the loading tanks at Fahahil (Ahmadi tank farm), directly east of the Burgan field, are being erected while the 12-in. transfer pipeline from Burgan, has been completed. The loading line is 22 in. Capacity of the four tanks is 556,000 bbl.

Destination of Production

No information is available here as to the destination of the 30,000-bbl. daily production, but it's believed that Anglo-Iranian Oil Co., Ltd.'s Abadan refinery—only about 120 miles from the Burgan field—will not process the crude. Kuwait Oil Co., Ltd., is jointly owned by Anglo-Iranian and Gulf Exploration Co.

All of Kuwait's wells were plugged with cement, early in 1942, when it was thought that the Nazis would reach this area.

At present two drilling rigs are working on well reconditioning in Kuwait, and as soon as the nine wells are recompleted, it's expected that the tenth well will be drilled. Burgan 5 and 6 have been recompleted and 4 is now testing. Meanwhile, the company is trying to obtain additional casing.

The ultimate objective in the Burgan field is to bring in all the wells as dual-zone producers. Of the four zones in the field, two are being opened, with production at about 2,500 bbl. daily expected from each zone, or 5,000 bbl. daily per well. Half-inch chokes are used.

During the war, the British mined asphalt at Burgan for use on landing field runways, but this operation has been discontinued. Gravity of Burgan oil ranges from 32 to 36.4 (A.P.I.), mixed base, about 1.9 per cent free sulfur. Wells are drilled to the upper Cretaceous formations at maximum depths of 4,750 ft. While this field alone has a proven reserve of about 5,000,000,000 bbl., it is now believed that this is a conservative figure.

Creole Given Assurances On Venezuelan Holdings

NEW YORK.—Assurances that the 1943 Venezuelan law regulating petroleum concessions will be respected and that no further capital profits taxes will be levied have been given to Creole Petroleum Corp. by the Venezuelan Government.

A letter to Creole stockholders from A. T. Proudfit, president, recalled that the company management in Caracas had sought since the October revolution clarification of the Venezuelan Government's "future intentions" and said assurances given it were later confirmed in a public statement by Romulo Betancourt, president of the Revolutionary Junta.

Betancourt's statement was quoted as follows:

"With regard to the denouncement made by a private party claiming that the petroleum law of 1943 is unconstitutional, I hereby ratify the already expressed opinion of the Venezuelan Government. We shall respect that law and we shall enforce it. We have no intention of accepting the thesis of its unconstitutionality.

"Any citizen is free to give his opinion . . . but the government has its own point of view which consists in not denying the legality of that law which regulates the relations between the Venezuelan State and the companies which hold petroleum concessions. Likewise, it is the definite criterion of the government not to establish new taxes on capital profits aside from the one contained in Decree 112 of December 31."

Creole production continues at a high level and is currently averaging approximately 485,000 bbl. daily, Proudfit added. The estimated earnings of the company will provide $2.37 per share of capital stock compared with $2.33 in 1944.

Canada Gets Most U. S. Exports

WASHINGTON.—Canada continued to be the United States' best crude-oil market during the first nine months of 1945, taking 95.7 per cent of the total exported during the period, Department of Commerce figures reveal.

Trends due to the war were apparent throughout the data which covered all exports of petroleum and its products. Russia was shown to have taken 54,113,831 gal. of blending agents and anti-knock compounds of petroleum origin of a total of 56,118,614 gal. exported. Of 30,947,765 bbl. of high-octane gasoline sent abroad, the United Kingdom took 16,744,911 bbl. and Russia, 2,189,175 bbl.

Monthly figures on exports of aviation gasoline showed a drop from 4,089,447 bbl. in January to 1,579,566 in July and to 55,435 in September—the month of the formal Japanese surrender.

The United Kingdom took 93.48 per cent of the 42,070,431 bbl. of motor fuel sent abroad, Russia received 2.61 per cent of the total.

The figures showed a total of 25,425,382 bbl. of crude was exported during the nine months. Canada took 24,078,559 bbl. Smaller amounts were sent to the United Kingdom and Mexico.

A total of 76,851,333 lb. of liquefied petroleum gas was exported, principally to Mexico and Canada. Nearly all of 9,764,768,000 cu. ft. of natural gas exported went to Mexico.

Other exports from January to September, inclusive, follow:

	Barrels
Lubricating oil, all types except aviation	2,829,283
Aviation lubricating oil	2,217,831
Natural gasoline	493,848
Kerosene	4,390,914
Gas oil and distillate fuel oil	24,852,627
Residual fuel oil	6,334,761
Naphtha, mineral spirits, solvents, and other light finished products	1,440,012
	Gallons
Ethyl fluid	2,234,972
Mixtures containing more than 3 cc. tetraethyl lead per gal.	67,050
White mineral oil	2,626,485
Other petroleum products, not elsewhere specified, except finished petroleum sprays and finished blended gasoline	2,827,134
	Pounds
Lubricating greases, except graphite lubricants	47,981,956
Petrolatum and petroleum jelly	31,600,017
Paraffin wax, refined and semi-refined	68,762,722
Paraffin wax, unrefined	40,849,791
Petroleum asphalt	282,918,720
Petroleum coke	279,899,200

Sinclair Assigns Lock to Ethiopian Concession

NEW YORK.—To commence field research work on Sinclair Oil Corp.'s concessions in Ethiopia, John H. Lock, assistant to L. V. Stanford, president of Sinclair Petroleum Co., arrived last week in Addis Ababa.

J. H. LOCK

Lock returned to the Sinclair companies last November after spending 3 years in the Marine Corps. Most of his service was in the South Pacific. For the past 2 months he has been assembling data for his postwar assignment overseas.

With Sinclair since his graduation from Texas Tech, where he obtained an A.B. degree in geology, Lock enlisted in the Marines in 1942 and saw service in Guam and Guadalcanal. He was with Sinclair for 6 years prior to the war, and worked as a field geologist in the Gulf Coast area out of Baton Rouge, La.

In his new assignment, Lock will work out of Addis Ababa. The Sinclair interests hold exclusive rights for exploratory work in Ethiopia.

DEATHS

William A. Butler, 59, member of the engineering department of Reed Roller Bit Co., died February 3 in Houston.

Charles E. Shimer, 64, civil engineer in the New York offices of Cities Service Oil Co., died January 31 in Mount Vernon, N. Y. Shimer had been with Cities Service for 35 years.

Elmer C. McIntosh, 64, Pennsylvania oil operator, died February 1 in Bradford. He had been a resident of Derrick City for 25 years and superintendent of various oil properties.

William T. Morris, 62, president of Sormir Petroleum Corp., director and first president of Circle Petroleum Corp., died February 6 in New York. Morris, president of American Chain & Cable Co., financed some of the early operations at Signal Hill and Kettleman Hills, Calif., and at Lost Soldier, Wyo., and in 1926 brought in the discovery well on the Hiawatha Dome, Moffat County, Coorado.

William Everett Kyle, 59, Wyoming oil man, miner and stockman, died in a hospital at Wheatland. He was born in Graham, Mo., and moved to Wyoming in 1900. He engaged in oil and mining operations in the Rawlins district and the discovery well in the Medicine Bow field was on his land.

Samuel W. Harrison, 80, retired oil producer, died February 5 in Parkers Landing, Pa.

B. H. Hubbard, 64, oil operator and former resident of Electra, Tex., died January 28 in Oakland, Calif.

Beecher M. Mott, 81, Bradford, Pa., oil producer, died February 4 in St. Petersburg, Fla.

Kenneth M. Bravinder, geologist for Union Oil Co., died in Long Beach, Calif. Associated with Union since 1936, Bravinder did extensive geological work in the Dominguez and Rosecrans areas.

Sam Daube, 86, Ardmore, Okla., business man and landowner with extensive oil interests, died February 8 in Dallas.

Elmer Vick, 67, former Oklahoma real estate and oil man, died February 9 in Tulsa.

Congress May Study WEP Sale 30 Days Longer

WASHINGTON.—A resolution to give Congress an additional 30 days to study proposals for disposition of the two big-inch pipe lines has been passed by the Senate and its adoption by the House is expected.

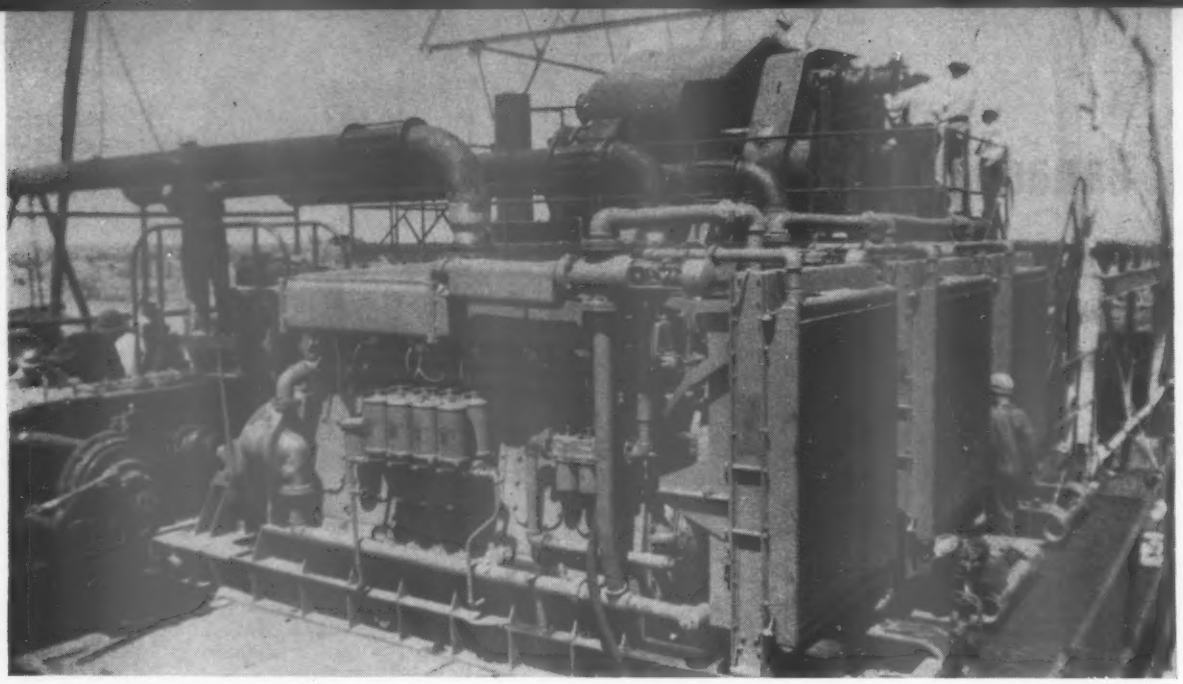
Under the surplus property act no plan for disposal of large government-owned projects can become effective until 30 days after submission to Congress. On January 14 the Surplus Property Administration filed its report on the big-inch lines recommending that an attempt be made to sell them for oil use and, this failing, they be operated by the Government as common carriers of oil.

The surplus property subcommittee of the Senate military affairs committee asked for the additional 30 days for study, and expects to hold hearings on the SPA proposal. A member of this subcommittee is Sen. Joseph C. O'Mahoney of Wyoming, who is also chairman of the Senate's petroleum resources committee which held extensive hearings on government pipe lines last fall before the SPA completed its report.

A.P.I. Production Group To Meet in Pittsburgh

The spring meeting of the division of production of the American Petroleum Institute will be held June 13 and 14 in Pittsburgh with headquarters at the William Penn hotel.

Chairman of arrangements for the meeting is Virgil F. Bowyer, Pittsburgh. S. M. Vockel, Dun-Mar Oil Co., is chairman of publicity committee.



The power house on the Trinity Drilling Co. big rig operating in the TXL field in West Texas consists of three 375-hp. six-cylinder atmospheric-type engines

Trinity's "Big Rig" Capable of Drilling To 20,000 Ft. in West Texas Area

by E. H. Short, Jr.

IN the TXL field, 26 miles northwest of Odessa, Tex., the Trinity Drilling Co.'s rig is referred to as "the big rig." This rig is powered by three six-cylinder atmospheric-type engines, each of which develops approximately 375 hp. at 800 r.p.m. This is the first drilling rig to which these engines have been adapted.

Unique Power Features

These Cooper-Bessemer prime movers are rigidly mounted to heavily constructed I-beam skids which facilitates setting up and moving. The speed of the engines ranges from 400 to 800 r.p.m. and it is centrally controlled. The idle speed is set on the floor and all engines may be shut down by the driller from the floor in the case of emergency.

These engines are equipped with overspeed governors which can be regulated through a dump valve on the fuel line. If the engine speed exceeds 820 r.p.m. the dump valve is automatically opened. When the speed recedes to 780-90 the dump valve closes and normal engine speed is again resumed. Other features which guard these engines against accidental damage include a lube-oil shutdown device. A failure in any of the oil lines causes the dump valve to open, thereby shutting the engine down immediately. A temperature shutdown device protects the engines in the event the temperature exceeds 180° F. This also works by means of fuel-dump manipulation.

The water temperature in these engines is automatically controlled by means of a three-way valve which bypasses water around the radiator to maintain a 6° temperature rise throughout the engines. The engine temperature runs about 138° and the bypass starts operating at 110° F.

These are four-valve engines, two exhaust and two inlet valves which are operated from two common push rods. This is somewhat different from conventional engines of this type and the greater valve area is conducive to obtaining maximum horsepower.

Power Transmitted to Draw Works From Ground Level

This Trinity rig is capable of drilling to 20,000 ft. in this area, and another feature contributing to the title of "big rig" is the transmission and draw-work equipment, which is completely air-controlled. The low speed drum clutch and high on the rotary clutch are direct air-actuated, requiring only 80 lb. air pressure. The master clutch on the selective transmission is Twin Disc, air-mechanically operated.

The master clutch is equipped with a Westinghouse Airbrake Co. neutral air brake so that in case of an accident requiring a quick stop the driller can apply this brake. This brake is also used for slowing down or stopping the drive shaft of the selective transmission so that a shift can be silently made from one speed to another. The neutral brake can also be used to permit adjustments necessary on the brake mechanism. By applying this brake and engaging the low-speed clutch the driller is able to make any adjustment on the drum brake, since this neutral brake has sufficient capacity to hold the traveling-block assembly.

The special type of transmission used on this rig permits the mounting of heavy power equipment at ground level. Power from the engines is stair-stepped up through the selective transmission to the draw works. This feature of transmission eliminates the necessity for an engine substructure, and thereby minimizes the amount of equipment to be installed when rigging up.

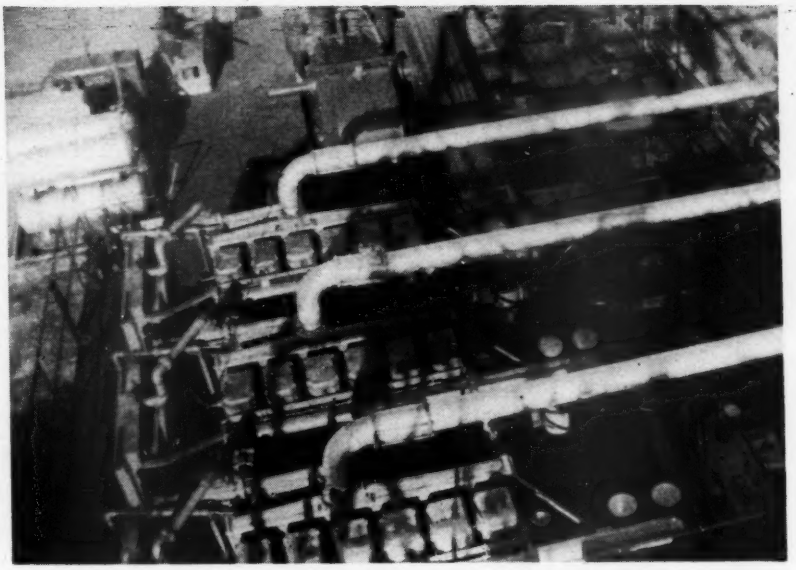
In addition to the compactness of this setup, such an arrangement makes a move from one location to

another a relatively simple operation because it is only necessary to break one chain connection between the selective transmission and draw works. The selective transmission remains with compounding transmission and the two pieces are within road-clearance limits.

The engine foundation is securely connected to the compounding transmission base and when bolted together makes a solid one-piece base. All chains, including the rotary chain, are in a total oil-spray enclosure.

The air controls to all clutches are mounted at driller's position, including the control to the mud pumps. The draw works on this rig are equipped with Emsco fluid level control for the Parkersburg hydromatic brake, and this enables the driller to maintain absolute control of resistance to his drum. At the driller's position there is a variable pressure hand valve and variable foot valve which are connected together in such a way that the driller can switch from foot or hand to operate the speed of the engines. The foot valve is used when going in or coming out of the hole and the hand valve can be set at any determined speed. In addition to this, there is a separate variable hand valve set along the regulator valve so that any engine may be separated from the regular hand control and operated individually. For example, if desired, the draw-works engine can be disconnected from the two remaining engines at the compounding transmission which will enable the driller to apply this engine to operation of the rotary independently, leaving the remaining two engines on the draw works.

In connection with the pumps, it should be mentioned that the two pump-clutch controls and the master pump clutch control can be operated by hand if an emergency so demands. The draw works is equipped with a positive low-speed jaw clutch which can be operated in case of a failure in the air system.



Derrick view showing layout of engines, pumps, and transmission equipment

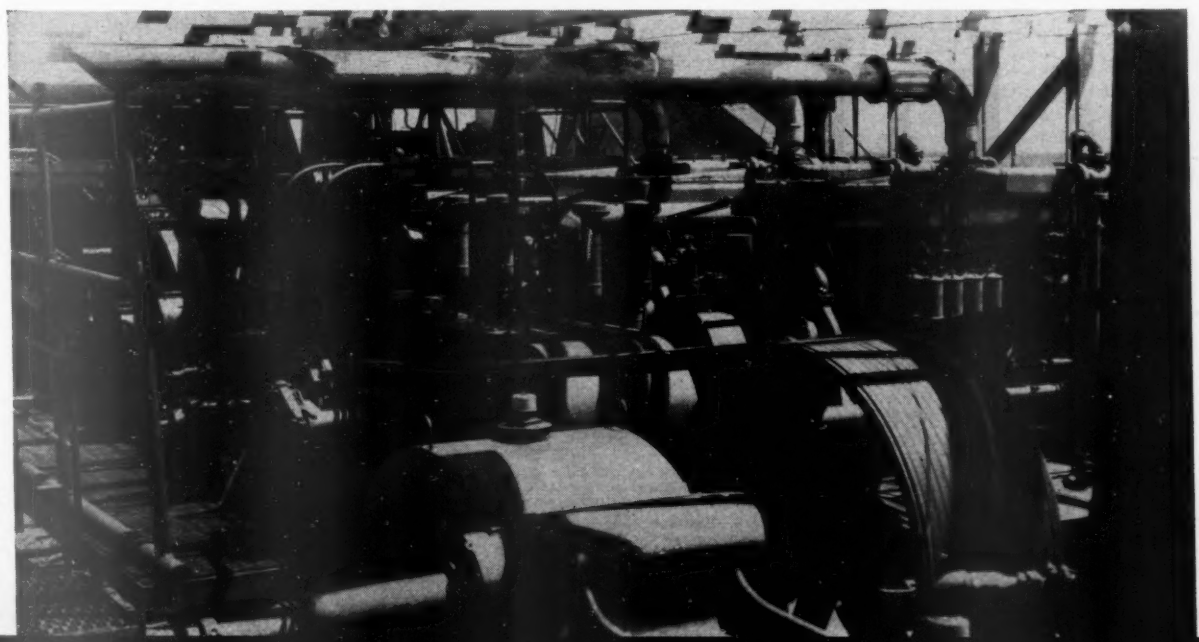
The design of the compounding transmission on this rig permits the installation of the General Electric Thirite generator which delivers 125 volts constantly, regardless of engine speed.

The Gardner - Denver two - stage air compressor operates off the compounding transmission. This compressor furnishes an adequate air supply to storage tank which is built into the compounding transmission skids. An automatic control stops the compressing of air when the tank is full.

One of the things contributing to the efficiency of this rig is the steel grating especially designed to fit entirely around the engine bases, pumps, and compounding transmission equipment. This is the first time this particular design has been used and crew members feel that it is an important contribution to the completeness of the setup of the rig.

The arrangement of the mud-pump manifold on this rig has three very practical advantages. In the first place it offers no obstruction to crew members when walking completely around the pumps. It is arranged so that it receives no strain when a pump is moved in order to tighten the belt.

Ground view on pump and transmission side. Stair-step transmission from ground to draw works shown at extreme left. Steel grating fits securely around all engine bases, pumps, compounding, and transmission equipment



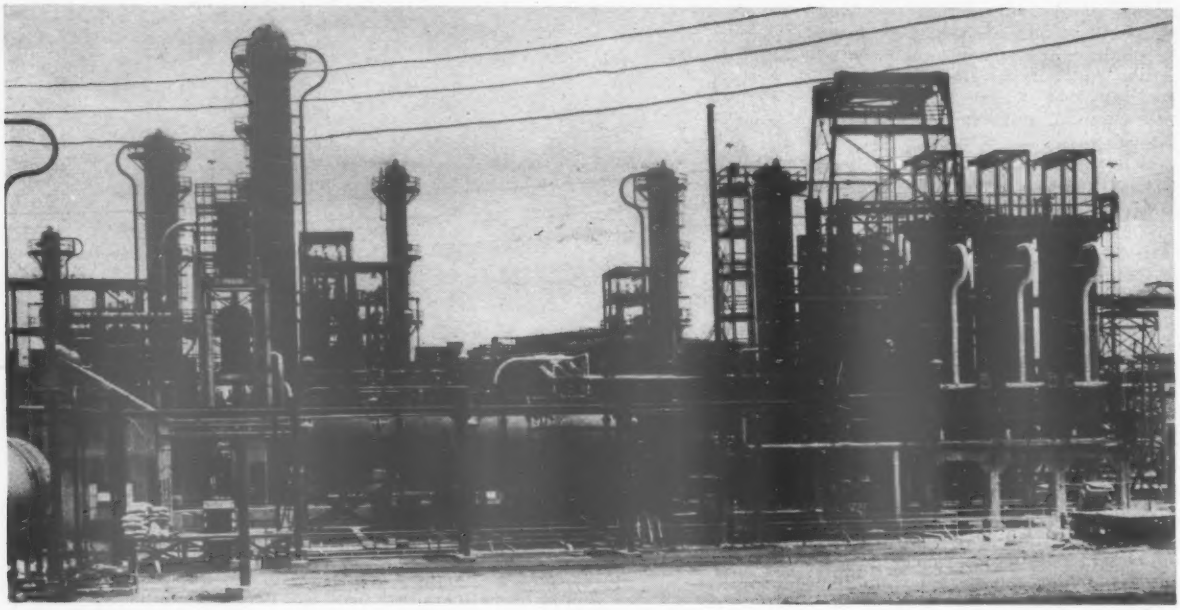


Fig. 1—HF alkylation unit, Phillips Petroleum Co., Borger, Tex.

German Wartime Aviation Fuels Largely Made by Hydrogenation of Coal

GERMAN aviation fuels during World War 2 were composed mainly of products obtained in the synthetic oil plants by the hydrogenation of coal and coal tar, a recent report made available by the Office of Research and Inventions, Navy Department, states.* While small quantities of components came from petroleum and from various chemical plants, it is significant that the statement is made that practically no aviation fuel was obtained from a Fischer-Tropsch synthesis plant.

Table 1 shows the sources of components from which German aviation fuels were blended.

It is noted that 4,700 bbl. per day of synthetic isoparaffins were produced, by methods which are discussed later in this article. The I.G. Farbenindustrie operated six plants for the production of aviation-fuel components, presumably mostly hydrogenation units. The Germans are reported to have understood well the various processes developed and in use in this country for making aviation-fuel components and applied as far as the nature of German raw materials and the exigencies of war permitted these methods to their own operations. By the end of the war the quality of German aviation fuels approached that of the United Nations, the report stated. In 1943, Germany's highest record of fuel output was reached, when motor-fuel production was about 55,000 bbl. per day, aviation fuels 56,000 bbl. per day.

Most of the aviation-fuel components made in Germany were derived from hydrogenation of coal tar or products therefrom, this Navy report states. Near the close of the war, 560,000 bbl. of such fuels, in two grades, were being produced for the use of the Luftwaffe, the German Air Force. Alkylate was made by methods similar to those in use in the U. S. A. Isoparaffins were made as in this country, with aluminum chloride as catalyst, in solid form, changing to an $AlCl_3$-hydrocarbon fluid complex during the progress of the reaction. Aromatics were made by destructive hydrogenation of coal and coal tar.

Two Grades of Aviation Fuel

The Germans made two grades of aviation fuel: the B-4 or Blue grade and the C-3 or Green grade. Tetraethyl lead equivalent to 4.35 cc. per gallon was used in both grades. The B-4 grade was a fraction from the liquid product from hydrogenation of

TABLE 1—SOURCES AND SUPPLY OF GERMAN AVIATION GASOLINE
(All figures are barrels per day)

Company and location—	Total aviation components	Base stocks and aromatics	Synthetic isoparaffins
I.G.—Leuna	6,900	5,500	1,400
Brabag—Bohlen	4,100	4,100	....
Brabag—Magdeburg	2,750	2,750	
Hibernia—Scholven	5,800	4,400	1,400
Gelsenberg—Gelsenkirchen	8,000	8,000	
Politz A.G.—Politz	13,900	12,400	1,500
Rheinbraun—Wesseling	2,750	2,750	....
Ruhrol—Welheim	1,100	1,100	....
Sudetendeutsche—Brüx	5,500	5,500	....
I.G.—Oppau	1,200	1,100	100
I.G.—Heydebrek	600	300	300
I.G.—Moosbierbaum	2,000	2,000	....
I.G.—Hüls	200	200	....
I.G.—Schopau	200	200	....
Total from above-listed plants	55,000	50,300	4,700
Aromatic oils from coal tar	1,100	1,100	....
Grand total	56,100	51,400	4,700

*Technical Report No. 145-45, "The Manufacture of Aviation Gasoline in Germany," by the U. S. Naval Mission in Europe, July, 1945.

coal tar, contained about 10-15 per cent of aromatics (by volume), 45 per cent naphthenes, and the remainder paraffins. Octane rating by methods equivalent to the C.F.R. Motor Method of test was 89. The C-3 grade contained 10-15 per cent of synthetic isoparaffins, that is, alkylates and isooctanes, and 85 per cent of an "aromatized base stock," said to be made by treating coal tar hydrogenated gasolines by hydroforming operations. The entire fuel could contain not more than 45 per cent of aromatics by volume. Some diluent other than the aromatized fraction, with probably more of alkylate, was used to make up the quantity required. The C-3 fuel is said to correspond more or less to the U. S. Grade 130, but its lean-mixture performance was somewhat poorer than 130, and its octane rating was only 95. Base stocks were cut to 300°-320° F. end points, no aromatic amines or other special additives were used, no isopentane was separated for special blending, and light components were adjusted merely for vapor-pressure control.

While oxidation inhibitors were not used and from the nature of the components should not be necessary, deposition of TEL was a problem in operation. No inhibitors were used to reduce this deposition tendency and it is believed that aromatics were limited to attempt to control this deposition. Table 2 shows the specifications for these two aviation-fuel grades.

TABLE 2—RLM SPECIFICATIONS FOR B-4 AND C-3 GASOLINES

	Blue grade B-4	Green grade C-3
Density at 59° F.	0.710—0.760	0.760—0.795
Distillation °F.,		
I.B.P.	104 min.	104 min.
10 per cent	167 max.	176 max.
50 per cent	221 max.	230 max.
90 per cent	320 max.	320 max.
E.P.	338 max.	356 max.
Recovery, % vol.	98 min.	98 min.
Reid vapor pressure, lb.	7.0 max.	6.3 max.
Aromatic content, % volume	25 max.	45 max.
Tetraethyl lead content, % volume	0.115—0.120	0.115—0.120
Ethylene dibromide content, % vol.	0.050—0.053	0.050—0.053
Melting point, °F.	—76 max.	—76 max.
Leaded octane No. (Motor method)	89 min.	95 min.

Using a test method similar to the C.F.R. method, the German fuels were tested for octane rating in engines of the following specifications:

Bore	65 mm.
Stroke	100 mm.
Volume	332 cc.
Power output at 900 r.p.m.	0.7 kw.
Consumption at 900 r.p.m.	600 cc. per hour
Compression ratio	4.0 to 15.0
Inlet valve clearance (cold)	0.20
Inlet valve opens	11° after top center
Inlet valve closes	173° after top center
Outlet valve clearance (cold)	0.25
Outlet valve opens	173° after top center
Outlet valve closes	3° before top center

The test method was carried out under the conditions as follows, showing ratings agreeing closely with C.F.R. ratings:

Speed	900 r.p.m.
Cooling medium, temp.	Glycol and water
Cooling medium, temp.	300° F.
Fuel-air inlet temp.	300° F.
Ignition	22° before top center
Compression ratio	Start of "medium heavy" knock

To determine mixture response, the fuels were tested in a single-cylinder Bayersche Motorenwerke engine under the following conditions:

Speed	1,600 r.p.m.
Compression ratio	6.5
Cooling air temp.	77° F.
Cooling air pressure	200 mm. H^2O
Begin liquid injection	26° to 30° after top center
Injection pressure	60 atmospheres
Inlet air temp.	175° to 265° F.
Ignition	Highest power output at air to fuel ratios of 07, 0.9, 1.3, without knocking
Air-to-fuel ratio	0.7 to 1.3
Measurement of knock	Audible

The outstanding shortcoming of the German aviation fuel was its poor lean-mixture performance. With its high aromatic content its rich-mixture performance was excellent at a less than 1.0 air:fuel ratio. Had more isoparaffins — alkylate — been used, the lean-mixture performance could have been improved correspondingly; these isoparaffins could not be manufactured in sufficient quantities in Germany.

Isoparaffin Syntheses

The Germans used the same two main methods for making isoparaffins as were used in this country: hydrogenation of polymerized olefins, especially butylenes; and alkylation of isobutane with butylenes. A much larger quantity of alkylate was made than was produced of hydrocodimer, as it is called in this country. Processes differed essentially in the method for obtaining the intermediate olefins and isoparaffins, as is shown below.

Isooctane production, carried out in

(Continued on page 114)

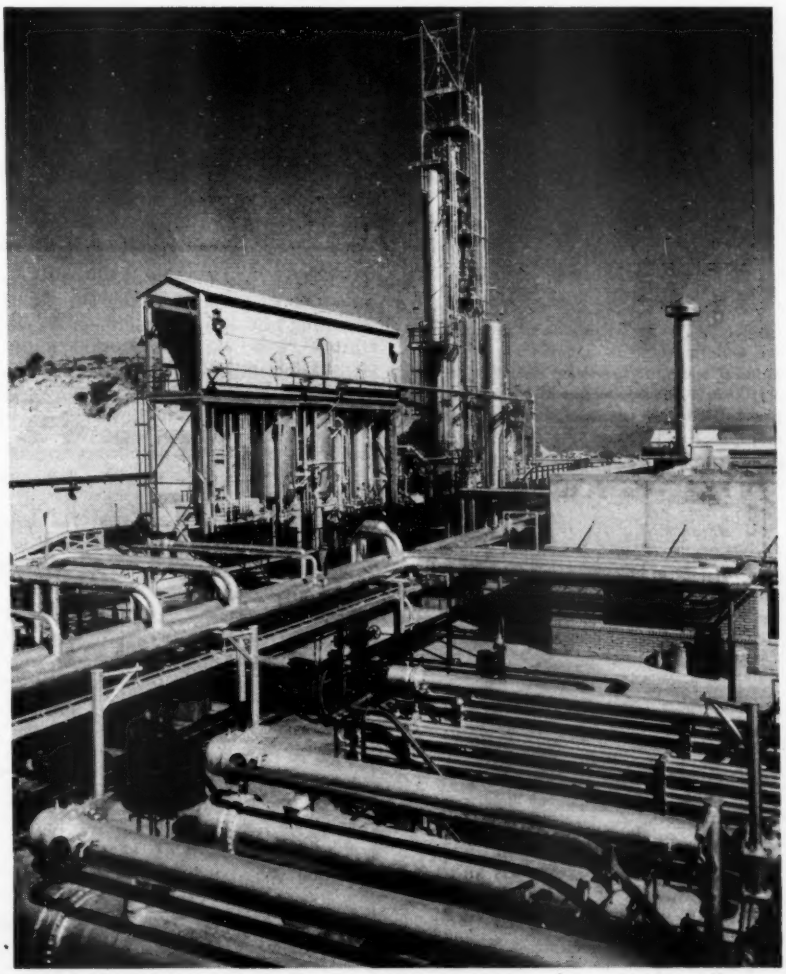


Fig. 2—Isomerization unit in refinery of Standard Oil Co. of California, Richmond, Calif.

Optima for a Given Producing and Operating Method

Investment, Producing Rate and Present Value

by Park J. Jones*

Summary on Optimum Rates of Production

THE optimum rate of production for the reserve recoverable at uniform rates of production is illustrated by the Q curve in Fig. 25-1. The optimum initial rate of production for uniform rates of depletion is given by the R curve. If a fraction "a" of a reserve is recoverable before production starts declining and a fraction (1 — a) at declining rates of production, the approximate optimum rate of production Q_o is defined by

$$Q_o = Qa + R(1 - a) \quad (1)$$

for uniform rates of depletion and by

$$Q_o = Qa + (Q + R)(1 - a)/2 \quad (2)$$

for increasing rates of depletion and by

$$Q_o = Qa + R(1 - a)(1 - m)^{1/2} \quad (3)$$

for decreasing rates of depletion where m is the fraction of the reserve (1 — a) which is marginal.

*Production consultant, Houston.

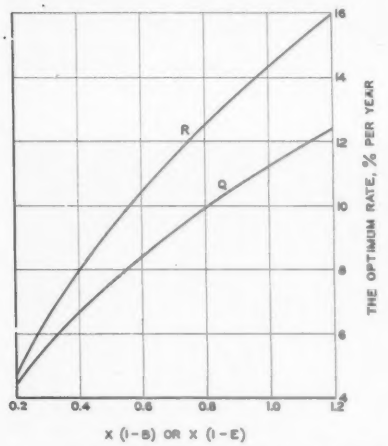
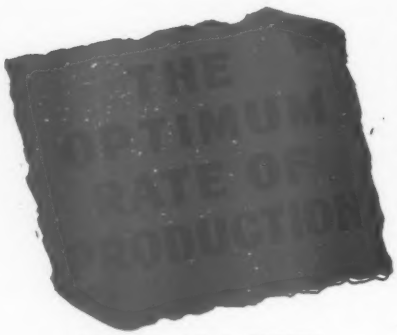


Fig. 25-1—The optimum rate of production Q for uniform rates of production and R for uniform rates of depletion vs. the product X (1 — B) and X (1 — E); X is the ratio of per-well annual producing rate to per-well investment; (1 — B) or (1 — E) is the income after operating outgo; interest rate is 3 per cent



PART 25 OF A SERIES

THE optimum investment in a reservoir and the optimum present value of a reserve are reviewed in this final article of the series. The data are relative to a given producing and operating method. But the size of a reserve for a given reservoir may vary significantly with producing and operating methods. Investments and operating expenses also vary with producing and operating methods. This brings us to optimum producing and operating methods. The problem of selecting the optimum producing and operating method for a reservoir may be more significant than that of estimating the optimum rate of production for a given producing and operating method. On the other hand, from the viewpoint of individual leases and migration of hydrocarbons in reservoirs, producing and operating methods are probably always more significant than the optimum rate of production.

However, the optimum rate of production is the background on which estimates of optimum producing and operating methods are made for reservoirs and for leases. This is why optimum rates of production precede optimum producing and operating methods in the order of presenting these series on the production of oil, condensate, and natural gas.

Optimum Investment in Reservoirs

If Q_o is the optimum rate of produc-

Fig. 25-2—The optimum investment in per cent of reserve for uniform rates of production Q and depletion R vs. the ratio of per-well annual producing rate to per-well investment; taxes and royalty and operating expenses are 30 per cent of gross production; interest rate is 3 per cent

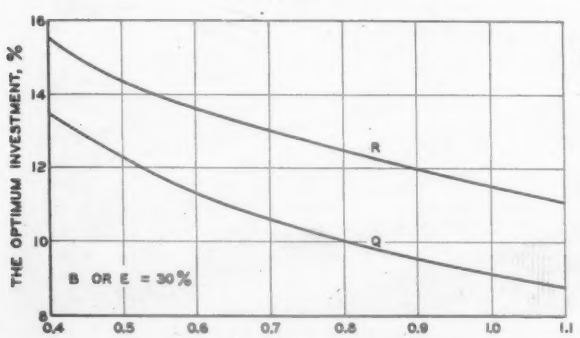
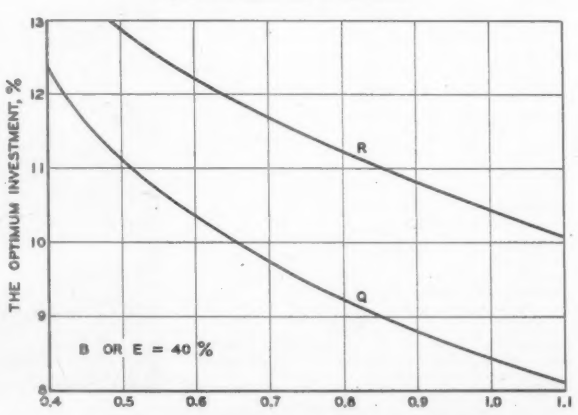


Fig. 25-3—The optimum investment for taxes, royalty and operating expenses equal to 40 per cent of gross production; see preceding figure for meaning of symbols



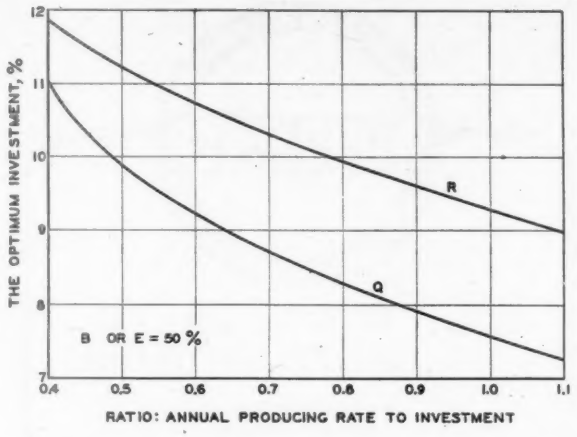


Fig. 25-4—(Above) The optimum investment for taxes, royalty and operating expenses equal to 50 per cent of gross production

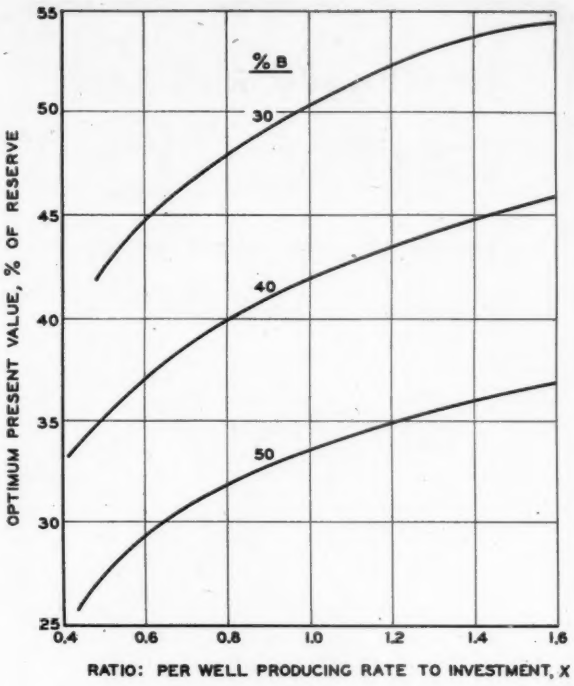


Fig. 25-7—(Right) The optimum present value of the reserve recoverable at uniform rates of production vs. the ratio X; interest is 3 per cent; B is the operating outgo in per cent of gross production

tion, the optimum investment I_o in reservoirs including plant investment is defined by

$$I_o = \frac{Q_o}{X} \qquad (4)$$

where Q_o is in M.c.f.'s per M.c.f., or barrels per barrel, per year of reserve and X is in M.c.f.'s, or barrels, per year per M.c.f., or barrel, invested per well. Per well investments include per well plant investments. The curves in Figs. 25-2, 3, and 4, are solution of Equation 4. Optimum investment in per cent of reserve is plotted against the ratio X for 30, 40 and 50 per cent burden on gross production. The Q curves are for uniform rates of production. The R curves are for uniform rates of depletion.

The optimum investment may also be plotted against the burden on gross production. The optimum investment for uniform rates of production is shown in Fig. 25-5 and for uniform rates of depletion, in Fig. 25-6. The optimum investment for some fractional combination of reserves recoverable before and after production starts declining may be obtained with the aid of Equations 1, 2, and 3.

Optimum Present Value of Reserves

The optimum present value P for uniform rates of production is defined by

$$P = \frac{Q}{i}(1 - e^{-i/q}) \qquad (5)$$

Fig. 25-5—The optimum investment for uniform rates of production vs. the sum of taxes, royalty and operating expenses; X is the ratio of per-well annual producing rate to per-well investment

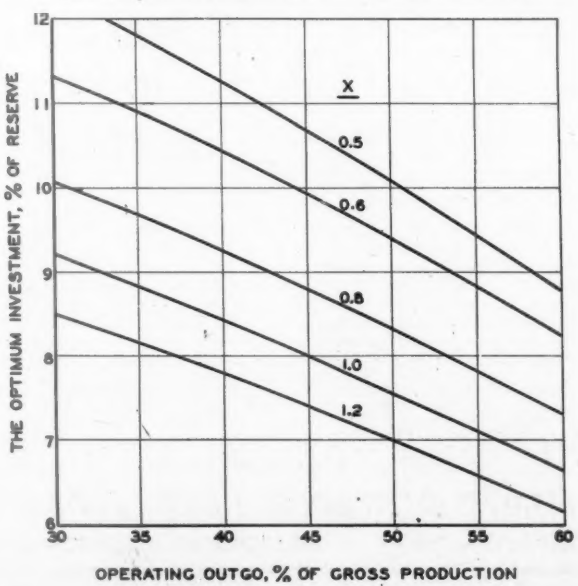
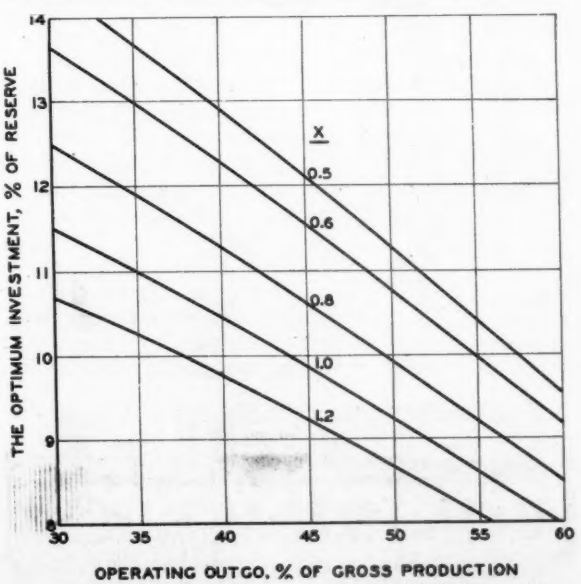


Fig. 25-6—The optimum investment for uniform rates of depletion vs. the sum of taxes, royalty and operating expenses; X is the ratio of per-well initial annual producing rate to per-well investment



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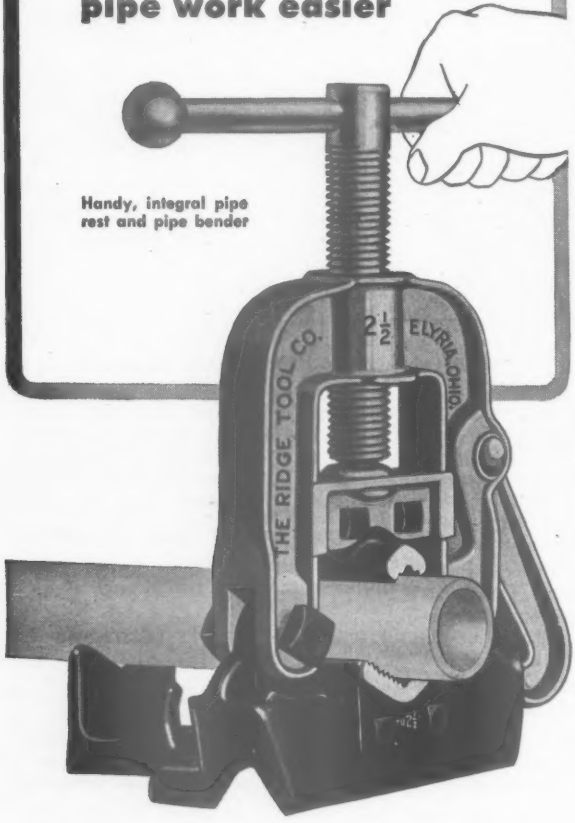

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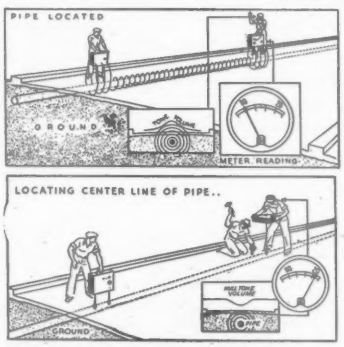

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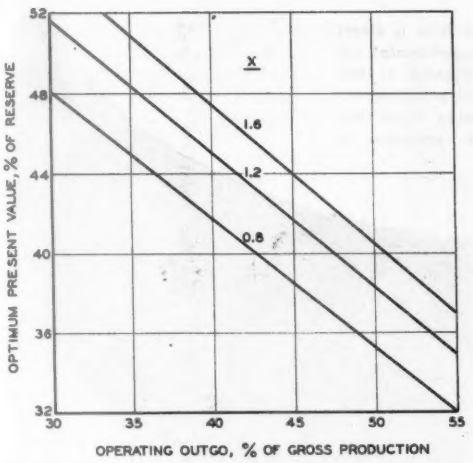


Fig. 25-8—The optimum present value of the reserve recoverable at uniform rates of production vs. operating outgo; interest is 3 per cent; X is the ratio of per-well annual producing rate to per-well investment

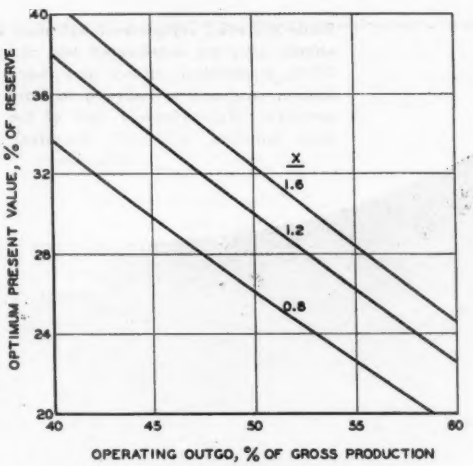


Fig. 25-10—The optimum present value of the reserve recoverable at uniform rates of depletion vs. operating outgo; interest is 3 per cent; X is the ratio of per-well initial annual producing capacity to investment

and for uniform rates of depletion by

$$P = \frac{R}{R + i} \qquad (6)$$

where i is the rate of interest; Q is the optimum rate of production for uniform rates and R is the optimum initial rate of production for uniform rates of depletion. The curves in Figs. 25-7, 8, 9, and 10 are solutions of the foregoing expressions. The optimum present value is plotted against a range of investments and operating outgoes commonly found in practice. The optimum present value for some fractional combination of reserves recoverable before and after production starts declining may be estimated approximately from the data in Figs. 25-7, 8, 9, and 10 with the aid of Equations 1, 2, and 3. For more accurate estimates of present values, the analytical procedures of the several articles in this series may be required.

Optimum Producing and Operating Methods

The foregoing data are relative to a given producing and operating method. But the size of a reserve for a given reservoir may vary significantly with producing and operating methods. Investments and operating expenses also vary with producing and operating methods. So operators have the problem of selecting optimum producing and operating methods. But the optimum producing and operating method for a reservoir usually does not represent the optimum conditions for individual leases. Migration of hydrocarbons either updip or downdip favors some leases at the expense of others.

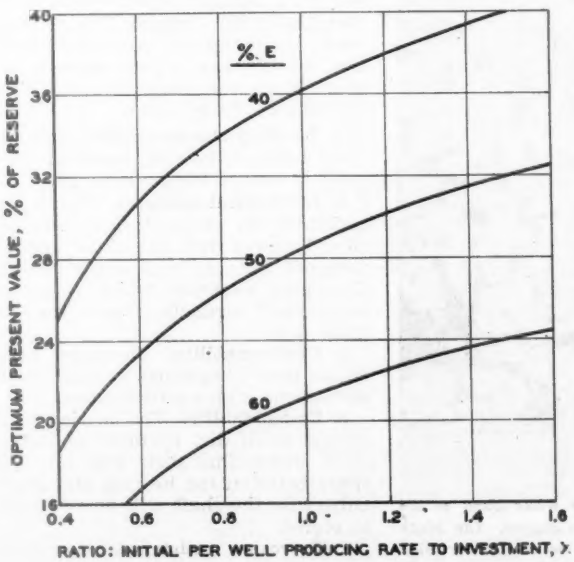


Fig. 25-9 — The optimum present value of the reserve recoverable at uniform rates of depletion vs. the ratio X; interest is 3 per cent; E is the equivalent operating outgo in per cent of gross production

The prospective differences between the optima for two or more possible producing and operating methods is the basis for estimating the optimum producing and operating methods for reservoirs. A similar comparison but in the light of migration of hydrocarbons is the basis for estimating the optimum producing and operating methods for leases. These procedures keep open the possibility of adjusting differences, reconciling conflicting interests and arriving at just estimates. As estimates of optimum producing and operating methods are based on optimum rates of production, this is why the latter precede the former in the order of presenting these series on the production of oil, condensate, and natural gas.

Note: This is the final article in the series, which began in the issue of September 1, 1945. Two previous series by the author have appeared in the Journal. The first, on "Development, Operation, and Valuation of Oil and Gas Properties," was published during the middle of 1942, and the second, on "Mechanics of Producing Oil, Condensate, and Natural Gas," was published during the latter part of 1944 and the first 5 months of 1945.

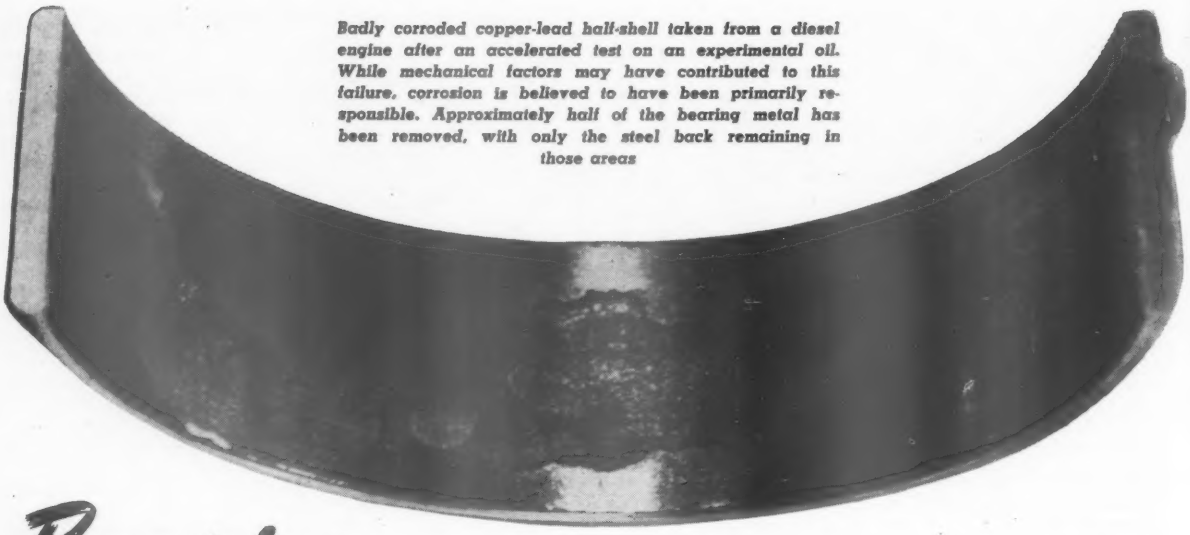
A.P.I. Expands Work of Lubricating-Oil Group

NEW YORK.—Organized to serve as a clearing house for the petroleum industry's lubricating problems, as well as for problems of the automotive and and aviation industries, the American Petroleum Institute last week announced the expansion of its lubrication committee activties.

Two subcommittee groups are slated to be formed, one to study automotive lube problems and the other to investigate industrial lubrication. The committee is scheduled to consider any necessary classifications and general recommendations on lubricants and to recommend the correct types of lubricants for new mechanical equipment, in addition to carrying on related activties.

L. C. Welch, Standard Oil Co. of Indiana, is chairman and Dayton P. Clark, Gulf Oil Corp., is secretary.

G. C. Roberts has resigned as district geologist for American Trading & Producing Corp. in Midland, Tex., to open a consulting office in that city.



Badly corroded copper-lead half-shell taken from a diesel engine after an accelerated test on an experimental oil. While mechanical factors may have contributed to this failure, corrosion is believed to have been primarily responsible. Approximately half of the bearing metal has been removed, with only the steel back remaining in those areas

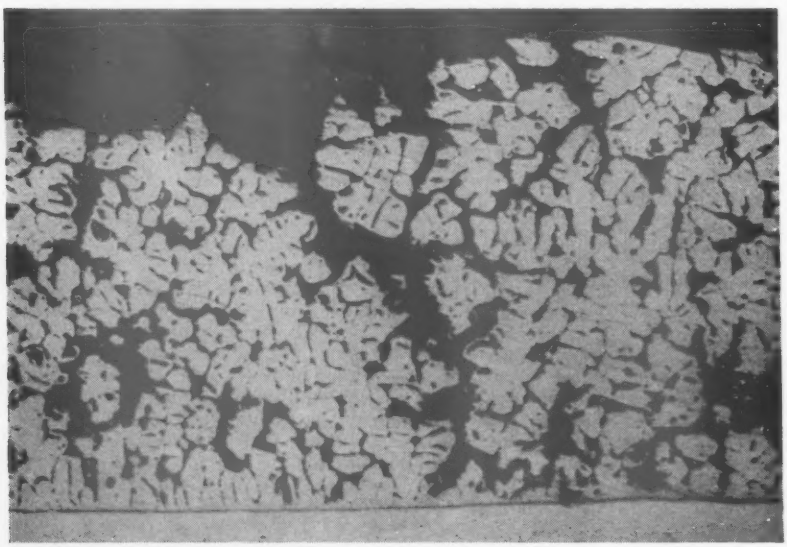
Bearing CORROSION

by H. H. Zuidema

PART 1

Introduction

TIN-BASE babbitt was used almost exclusively at one time as a bearing metal, and bearing corrosion was virtually unheard of, since this composition is very resistant to attack even by severely deteriorated lubricating oils. However, with the development of engines operating at higher speeds and loads, bearings became subjected to greater pressures and temperatures, and babbitt, which under more moderate conditions is almost ideal bearing metal, began to fail due to inadequate fatigue resistance. This led to the development of new bearing compositions which are more durable mechanically, but which are generally more reactive chemically.



Photomicrograph of cross-section of corroded copper-lead bearing. The white band at the bottom is the steel back. The white in the remainder of the picture is copper. The black represents lead, and the dark gray, areas where lead has been removed by corrosion

Bearing Metals

The following properties, in addition to such items as cost and availability, must be considered in the selection of a bearing metal for a given application:[2 20 22]

1. **Fatigue strength.**—The development of fatigue cracks, which ultimately surround and undermine local areas, must be avoided. Fatigue is the most common cause of bearing failure in actual practice.[22]

2. **Antifriction and nonscoring characteristics.** The coefficient of friction between bearing and shaft should be low, and the bearing and shaft should not seize during temporary periods of metal-to-metal contact. The bearing metal should have a low rate of wear, but should wear in preference to the shaft, since the latter is more difficult and costly to replace.

3. **Bonding characteristics.** A strong bond between bearing metal and the steel or bronze back is essential.

4. **Mechanical strength.** This is the resistance to extrusion by compression. Failures from this cause are not frequent, because most alloys contain hardening elements which raise the mechanical strength above the fatigue limit.

5. **Conformability.** Bearings must adjust their dimensions to slight shaft deflections and misalignments.

6. **Embeddability.** The bearing must embed small dirt particles and steel chips which find their way into the space between the bearing and shaft. Otherwise the shaft will be scratched or scored.

7. **Corrosion resistance.** Corrosion,

as mentioned earlier, has become a serious problem in the newer bearings containing cadmium or lead which were developed because of their greater fatigue resistance than that of babbitt.

A large number of bearing metals have been developed, none of which possess all of the above-mentioned properties in the optimum degree. All have their advantages and disadvantages. Since the relative importance of these requirements varies with the application, the choice of bearing metal varies likewise, and is often a matter of compromise.

Bearing metals can be classified into ten groups, largely according to composition. This classification is not absolute since there is considerable variation within most of the ten classes. Furthermore, some bearings are composed of two layers of bearing metal of different composition, i.e. the so-called "sandwich" bearing, which was used in the 1941 Buick.[41] However, practically all of the bearings used today will fall into one of the following groups:

1. **Tin-base babbitt.** A typical composition[39] consists of 89 per cent Sn, 7.5 per cent Sb, 3.5 per cent Cu. The journal box patented by Isaac Babbitt[1] in 1839 used an alloy of the general composition of pewter or Britannia metal, which belongs to this class. Tin-base babbitt is generally regarded as best all-around bearing metal for conditions of moderate loads and temperatures. It has been extensively used in passenger cars, as shown in a survey of 1938 model cars.[2] All but 3 out of 46 used babbitt in main bearings, and all but 5 in the connecting rod bearings. While the type of babbitt was not specified, it was probably tin base in a majority of cases, since lead-base babbitt was not used to any great extent at that time.

2. **Lead-base babbitt.** This type of bearing is somewhat inferior to tin-base babbit,[3,39] but has the advantage of lower cost and greater availability, particularly during periods of war. Five to 10 per cent of tin is often included, and the antimony content is roughly twice that of tin-base babbitt. About 1 per cent of arsenic is usually present.

3. **Alkali-hardened lead.** Lead is too soft to be used as a bearing metal by itself, but it can be hardened by the addition of a small amount of alkali or alkaline earth metal, e.g. Na, Li, Ca, Ba, Sr. A hard intermetallic compound is formed,[39] which is supported in the lead. This compound, in the case of calcium in lead, is Pb_3Ca, according to Brasch.[5] The amount of alkali or alkaline earth element present is normally of the order of 1 per cent. Bahnmetall, which contains calcium, lithium, and sodium, has been used in locomotives in Germany for a number of years, and Satco, which contains calcium, is used to a limited extent in this country, mostly in large bearings. Other members of this class are "No Heet," Ulco metal, Frary metal, Mathesius, and Lurgi Lagermetall.[23] Alkali hardened lead is soft enough that it does not require specially hardened shafts. It is like babbitt in this respect. However, it does not have the corrosion resistance of babbitt.

This is the first of three parts of an article based on a comprehensive survey of the literature as well as the results of investigations by the Wood River research laboratories of Shell Oil Co., Inc. The author, who has been with these laboratories for 10 years, has worked on various problems associated with the performance of petroleum fuels and lubricants. A native of Michigan, he attended Western Michigan College, and later, University of Michigan, where he received his Ph.D. degree.

4. **Cadmium alloy.** Cadmium-silver, previously mentioned as having been used in the 1935 Pontiac, consists of about 98 per cent cadmium, a small percentage of copper, and the remainder silver. Cadmium-nickel and cadmium-magnesium contain 0.25-7 per cent Ni, and 0.5-5 per cent Mg, respectively.[23] Cadmium-alloy bearings have excellent mechanical properties, but are subject to corrosion, and are too hard to be used except with hardened shafts. Cadmium-silver requires a shaft having a minimum hardness of 250 Brinell.[33,39]

5. **Copper-lead.** This bearing metal is unique, according to Melhuish[29] and Raymond,[35] in that it consists of a hard copper matrix, with the softer lead particles interspersed. Both phases are probably continuous, since these bearings are sometimes made by sintering a mixture of the powdered metals. This structure is different from that of most bearings, in which hard crystals are dispersed in a soft continuous supporting phase. The ratio of copper to lead varies from 25:75 to 50:50. The two metals are virtually insoluble in each other. Copper-lead bearings require a shaft having a minimum hardness of 300 Brinell. They, like cadmium alloy bearings, are subject to corrosion. They are used quite extensively in diesel engines.

6. **Bronze.** Copper is the principal ingredient of this alloy. Tin is always present, and sometimes lead and phosphorus. Phosphor-bronze is used in heavy-duty work, as in gear-box bushings and spring shackles; and lead bronze, which contains up to 20 per cent lead, is used mainly by railway engineers. This type of bronze is used as a solid bearing, whereas the five classes mentioned previously are usually mounted on a steel or bronze back.

7. **Silver.** Silver has many properties desirable in a heavy-duty bearing metal. It has good mechanical and fatigue strength, and resists corrosion, but its antifriction characteristics are not entirely satisfactory. This

Photomicrograph of surface of corroded copper-lead bearing. The areas where the lead has been corroded away are black. The remaining copper appears white in the photograph

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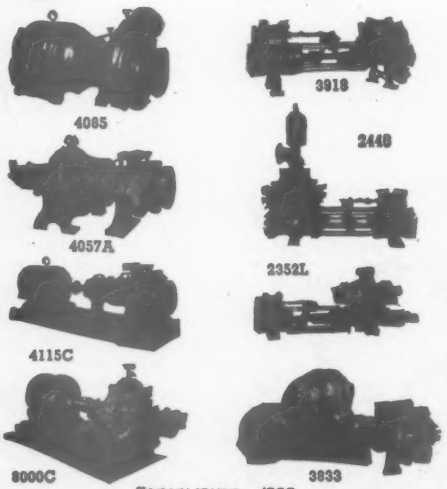

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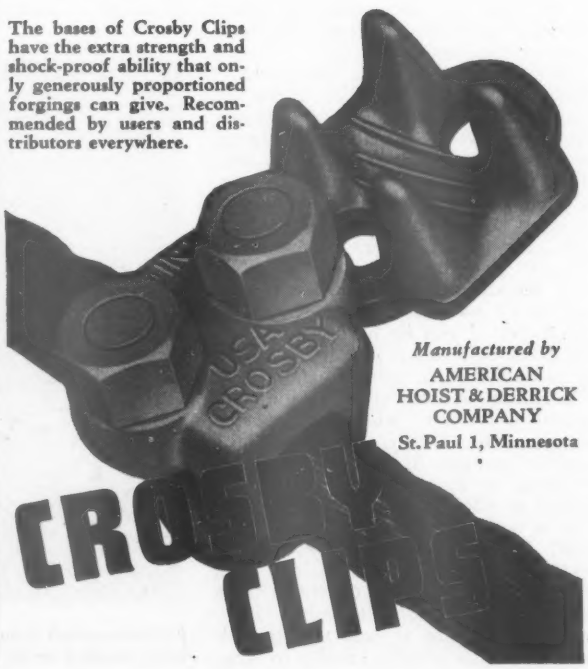

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property can, however, be improved by the incorporation of a low concentration of lead. Steel-backed silver bearings, plated with a thin deposit of lead, and then with a thin deposit of indium, are used in aircraft engines. They are said to have the advantages of silver, plus the requisite "oiliness," or antifriction characteristics, which pure silver lacks.[6]

8. **Aluminum alloy.** Considerable work on aluminum bearings containing small amounts of copper, silicon, iron, or other metals, has been done in Germany.[17] Such bearings have good mechanical properties at high temperatures, good antifriction characteristics, low wear, and good thermal conductivity and workability. However, they have a high coefficient of thermal expansion which makes it difficult or impossible to bond the bearing metal to a steel shell, and necessitates special mechanical construction. They also possess poor run-in characteristics, due to their hardness and high melting points. Rolls-Royce, in England, has developed an alloy containing approximately 90 per cent Al, with about 5 per cent Sn, 1-2 per cent Ni, and small amounts of other metals such as Cu, Mn, Si, Fe, Mg, and Sb, which is used in aircraft engines. Bearings made from this alloy are said to resist corrosion. They require shafts in main bearings of at least 600 Brinell hardness according to Hives and Smith.[16] However, Melhuish[20] claims that aluminum alloy containing a maximum of 0.4 per cent Si, and heat treated at 180° C. can be used with crankshaft as soft as 280 Brinell, which is comparable with that required with Cu-Pb and Cd-Ag. Aluminum bearings have been successfully used in diesel engines in this country, although their application is, as yet, not extensive.

Magnesium alloys have also been investigated in Germany,[17] but they appear to offer no advantage over aluminum alloys.

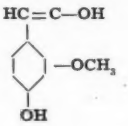
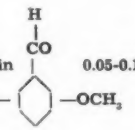
9. **Zinc alloy.** This is probably the least known of the 10 groups in this classification. Melhuish[20] mentions an alloy containing 4 per cent Al, 2.7 per cent Cu, 0.03 per cent Mg, and the remainder zinc. It is inexpensive and can be die cast under pressure. It is used under conditions of mild loads and temperatures. Gersdorfer[15] sets the maximum temperature to which zinc alloys may be subjected at 70°-80° C.

10. **Sintered powdered metals.** These are generally made of powdered bronze which is placed in a mold and subjected to pressure and then sintered. They are usually impregnated with oil before use. Their principal application is in bearings which do not carry heavy loads.

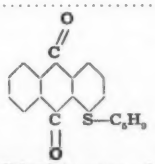
Note: References for the entire series will appear with the third and final installment.

APPENDIX 1—SUMMARY OF COMPOUNDS CLAIMED IN U. S. PATENTS AS BEARING CORROSION INHIBITORS

1. Compounds Containing Only Carbon, Hydrogen, and Oxygen

Pat. No. & date issued	Inventor	Compound	Concentration (per cent)
2,133,734 10-18-38	Moser, F. R.	Alkyl succinic acids, both saturated and unsaturated, e.g., reaction product cracked wax + maleic anhydride	0.25
2,145,970 2-7-39	Cantrell, T. L., and Turner, J. O.	Isoeugenol 	0.1-0.2
2,145,971 2-7-39	Cantrell, T. L., and Turner, J. O.	p Hydroxy-m-alkoxy benzaldehyde e.g., vanillin 	0.05-0.1
2,195,510 4-2-40	Cantrell, T. L.	Diisobutylphenol	0.1
2,198,851 4-30-40	Wiezevich, P. J., Zimmer, J. C., Morway, A. J.	High-boiling esters of polyhydroxy alcohols and monobasic acids, e.g., glycol monopropionate	0.1-0.4
2,202,826 6-4-40	Brandes, O. L.	2-6-Di-tert. butyl, 4-methyl phenol	0.2
2,204,597 6-18-40	Humphreys, R. C., and Borsoff, V. N.	Esters with C=C group, e.g., diamyl maleate, amyl fumarate	1.0
2,204,598 6-18-40	Humphreys, R. C., and Borsoff, V. N.	Esters of polycarboxylic acids, e.g., diethyl oxalate, diamyl succinate	1.0
2,204,601 6-18-40	Kavanagh, F. W., Borsoff, V.N., Humphreys, R. L.	Hydroxy esters, e.g., dibutyl tartrate, diamyl tartrate	0.5-1.0
2,214,401 9-10-40	Cannon, M.R., Varteressian, K. A.	Oxalic acid and ethyl oxalate	0.1
2,214,443 9-10-40	Varteressian, K. A.	Lake-forming substance, e.g., alizarin, anthragallol	0.03-0.1
2,270,577 1-20-42	Bergstrom, R. F., Phillips, E. E.	Ditertiary butyl cresol, 2,4-dimethyl, 6-tert. butyl phenol	0.25-1.0
2,321,577 6-15-43	Clayton, J. O. Farrington, B. B.	Keto esters	0.1-1.0
2,350,489 6-6-44	Beare, L. E.	Alizarin and alizarin stearate	0.5-0.75

2. Compounds Containing Sulfur

2,109,463 3-1-38	Cantrell, T. L., Turner, J. O.	Organic thio ethers of alpha anthraquinone, e.g., amyl thio ether 	0.1
2,113,810 4-12-38	Lincoln, B. H., Steiner, W.L.	Sulfurized mono or di-hydric ester of linoleic acid. Rape seed oil, soya bean oil, etc., used as starting material	....
2,113,811 4-12-38	Lincoln, B. H., Steiner, W. L.	Sulfurized ester or organic acids whole glycerides occur in corn oil	....
2,139,725 12-13-38	Cook, F. W.	Triphenylarsinesulfide, $(C_6H_5)_3As{=}S$	0.2
2,161,585 6-6-39	Moran, R. C., Fuller, E. W.	Dixanthyl ethyl ethers, $(R{-}O{-}\overset{\overset{S}{\|}}{C}{-}S{-}C_2H_4)_2O$, where R may be ethyl, benzyl, or isopropyl	0.1
2,179,062 11-9-39	Smith, H. G.	Sulfo-chlorinated mono esters of fatty acids, e.g., reaction product of sperm oil and sulfur chloride, containing 2-6 per cent S, 2-7 per cent Cl	0.2-2.5
2,186,646 1-9-40	Lincoln, B. H., Steiner, W. L.	Sulfurized mono and di-hydric esters of organic acids, e.g., methyl oleate	0.02 added sulfur

(Continued on Next Page)

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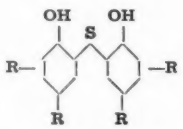
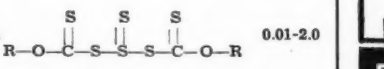
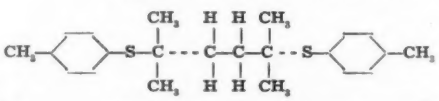
APPENDIX 1—SUMMARY OF COMPOUNDS CLAIMED IN U. S. PATENTS AS BEARING CORROSION INHIBITORS

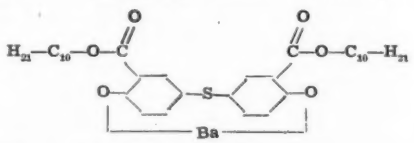
Pat. No. & date issued	Inventor	Compound	Concentration (per cent)
2,192,874 3-5-40	Smith, H. G., Cantrell, T. L.	Dialkyl polysulfides, e.g., diamyl di, tri, and tetrasulfide	0.1
2,193,331 3-12-40	Hamilton, L. A., Fuller, E. W.	Reaction product of sulfur chloride and aromatic petroleum extract—contains 1-2% Cl, 2-3% S	0.1-5.0
2,202,128 5-28-40	Torone, C. C., Meyer, W. N.	H_2SO_4, at least 94%	0.02
2,204,660 6-18-40	Cantelo, R. C.	Thiobenzophenone, $(C_6H_5)_2C{=}S$	0.5-1.0
2,113,988 9-10-40	Lincoln, B. H., Hendriksen, A., Wolfe, J. W.	Halogenated thio ethers, e.g., dichlorodiethylsulfide	0.1-0.2
2,220,941 11-12-40	Moran, R. C.	Dimercaptyldiethyl ethers, e.g., diamylmercaptyldiethyl ether	0.1-0.25
2,222,431 11-19-40	Colin, P. G.	Free sulfur	0.1-0.5
2,246,712 6-24-41	Barth, E. J.	Di (lauryl phenol) disulfide	0.3
2,249,626 7-15-41	Cook, E. W., Thomas, W. D.	2,4-dialkylphenol sulfides and metal salts	0.15-0.5

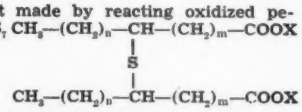


2,250,545 7-29-41	Mikeska, L. A., Lieber, E.	Xanthogen tetrasulfides, 	0.01-2.0
2,253,228 8-19-41	Cantrell, T. L., Turner, J. O.	Reaction product of sulfur chloride and substituted phenol	0.5-1.0
2,257,750 10-7-41	Lincoln, B. H., Byrkit, G. D.	Organo-metallic or organic salt of sulfur-bearing organic acid., e.g., triphenyl tin salt of sulfurized corn oil acids; diphenyl boron mercaptostearate	0.001-0.1
2,257,751 10-7-41	Lincoln, B. H., Byrkit, G. D.	Tin salt of sulfurized carboxylic acids, e.g., soya bean acids	0.1
2,278,224 3-31-42	Subkow, P.	Compounds of type R—X—R—X—R, where R is hydrocarbon or substituted group, R is alkyl, and X is S or Te, e.g., 2,5-dimethyl hexane, 2,5-bis p-tolyl sulfide	0.5-2.0



2,282,707 5-12-42	Cook, E. W.	$R_1R_2R_3M{=}S$, where M=metal from Group 5, e.g., triethyl stibine sulfide, tribenzyl arsine sulfide	0.2
2,311,931 2-23-43	Cook, E. W., Thomas, W. D.	Salicylate monosulfides, e.g., Barium decyl salicylate monosulfide	0.4



2,313,248 3-9-43	Lincoln, B. H., Steiner, W. L., Byrkit, G. D.	Sulfurized olefins	....
2,316,090 4-6-43	Kelso, C.D., Mixon, L. W.	Sulfurized mineral oil containing about 1.5% free S (used in conjunction with phosphorus compounds)	0.25-1.0
2,317,666 4-27-43	Burwell, A. W., Camelford, J. A.	Sulfurized product made by reacting oxidized petroleum with P_2S_7  m and n are greater than 11 and less than 49; X = H, metal, or alkyl group	0.5

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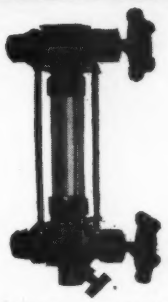

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LAYNE

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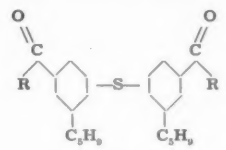
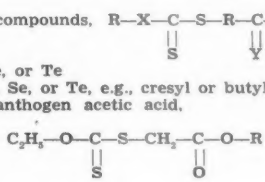
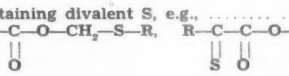
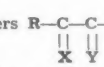
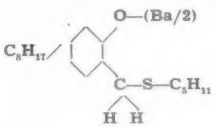
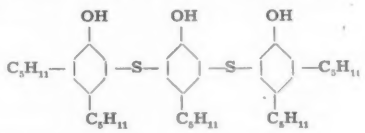
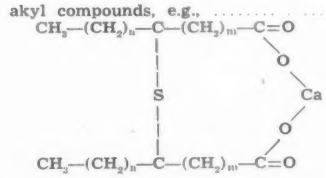
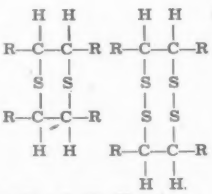
VERTICAL TURBINE PUMPS

APPENDIX 1—SUMMARY OF COMPOUNDS CLAIMED IN U. S. PATENTS AS BEARING CORROSION INHIBITORS

Pat. No. & date issued	Inventor	Compound	Concentration (per cent)
2,319,662 5-18-43	Cook, E. W., Thomas, W. D.	Substituted phenol monosulfides and metal salts, e.g., Barium-2-stearoyl or lauroyl-4-amyl-phenol monosulfide 	0.3-0.4
2,320,287 5-25-43	Lieber, E., Mikeska, L. A.	Xanthogen compounds, R—X—C(=S)—S—R—C(=Y)—X—R  X = O, S, Se, or Te Y = H, O, S, Se, or Te, e.g., cresyl or butyl ester of ethyl xanthogen acetic acid,	0.2
2,321,575 6-15-43	Clayton, J. O., Farrington, B. B.	Esters containing divalent S, e.g., 	0.5-2.0
2,321,577 6-15-43	Clayton, J. O., Farrington, B. B.	Thio keto esters R—C(=X)—C(=Y)—Z—R, where X, Y, and Z are sulfur or oxygen 	0.1-1.0
2,322,376 6-22-43	McCleary, R. F., Roberts, S. M.	Substituted thio alkyl phenols and their salts, e.g., Barium amyl thio methyl octyl phenol 	0.5
2,326,483 8-10-43	Moran, R. C.	Compounds of type R—S—R_1—O—R_1—S—R, e.g., diamylmercaptyl dimethyl ether	0.25-1.0
2,366,074 12-7-43	Cook, E. W., Thomas, W. D.	Salts of phenol sulfides, e.g., Ba salt of bis (2,4-diamyl phenol)-4-amyl phenyl dithio ether 	0.5
2,337,868 12-28-43	Burwell, A. W., Camelford, J. A.	Thio akyl compounds, e.g., 	0.5-3.0
2,346,156 2,346,157 4-11-44	Farrington, B. B., Kostainsek, V. M. and Denison, G. H.	Multibridged Thiomers, e.g., 	0.25-1.0
2,354,550 7-25-44	Rosen, R.	Compounds of structure R—S—R′—C(—Y)—X, where Y = R = aliphatic, R′ = aliphatic or naphthene, Y = O or S, and X is group replaceable by H through hydrolysis, e.g., lead alpha amylmercaptyl stearate	....

Spudder Drills to 6,198 Ft. In Gibson County, Indiana

SOMETHING on the order of a new spudder drilling-depth record was recently made with the finaling of 1 Ada Bingham for R. D. Brown, Inc., in NE NW SW 16-1s-11w, Gibson County, Indiana. The wildcat was abandoned when it showed a hole full of sulfur water after drilling 118 ft. into the St. Peter sand, which was topped at 6,080 ft. This well is reported to have been the first St. Peter test within a 60-mile radius from Princeton, if not the deepest hole drilled by any method in the tristate area of Illinois, Indiana and Kentucky.

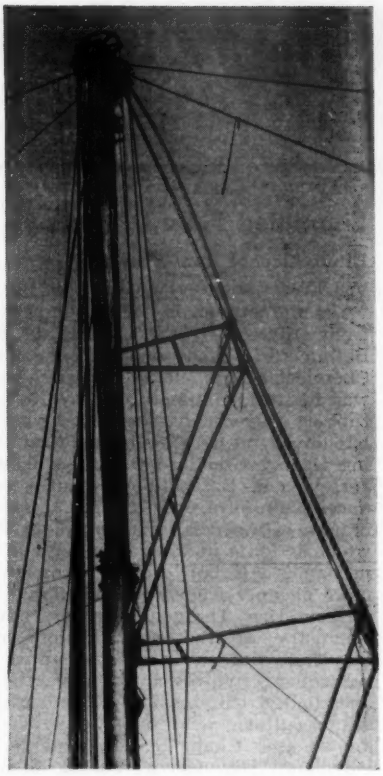
L. E. Gray, the contractor, is a veteran cable-tool drilling contractor of 30 years' experience and the 1 Bingham is the deepest job of his career, which included 23 years of drilling with standard rigs prior to his changeover in 1941 to spudder operation.

Elevation of the well was 398 ft., and the Glen Dean was 1,683 ft., Cypress 1,899 ft., Ste. Genevieve 2,083 ft., Devonian 3,755 ft., Corniferous 4,950 ft., Trenton 5,315 ft. Very slight shows of oil were found in the McClosky at 2,238-40 ft., in the Salem at 2,580 ft., and in the Trenton at 5,385-95 ft. and 5,455-60 ft.

A total of six casing strings were used, with 15½-in. set at 140 ft., 12½-in. at 700 ft., 10-in. at 1,200 ft., 8-in. at 1,584 ft., 7-in. at 2,089 ft., and 5½-in. at 4,640 ft.

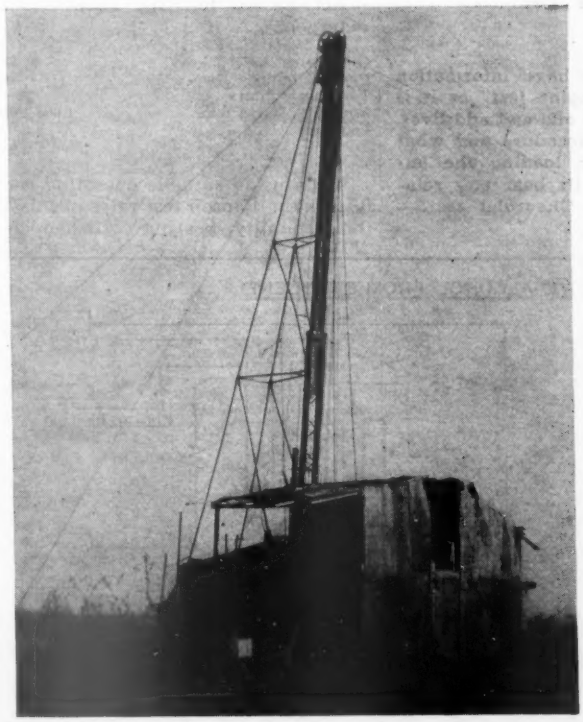
The 36-L Bucyrus-Erie machine used by Gray had a 54-ft. telescoping derrick equipped with a casing strut which permitted the use of a six-part tackle for handling heavy casing loads. The rig is mounted on dual pneumatic wheels for easy transporting as a semitrailer hitched to a truck. Powered by a 110-hp. Buda engine, the three reels have two forward speeds and quick reverse with friction-clutch control.

In taking the well down, the 5½-in. casing was originally set at 3,766 ft. and 5-in. hole carried to 4,125 ft., where another hole full of water was encountered. To straight ream ahead, the 5½-in. casing was pulled. In pulling the 3,766-ft. string, it pulled apart at 1,650 ft. Before parting, however, 46 in. of stretch was taken in the pipe with the calf line over the regular strut-equipped spudder derrick. As this casing was taken from the hole, the drilling crews noted that all except five of the casing couplings could be turned by hand, having been loosened by the heavy pull.



Casing strut which equipped the derrick for six-part tackle and facilitated handling of the total 10,353 ft. of casing

During the deeper phase of drilling, to prevent excessive cable weight, a tapered drilling line was used, made up of 2,500 ft. of ⅞-in. line and 4,000 ft. of ¾-in. The sand line, too, was tapered, consisting of 3,000 ft. of $\frac{5}{16}$-in. and 3,500 ft. of ½-in.



Left: Proper guying of the derrick did much to simplify problem of handling tool loads. Total tool and cable weight (for drilling line) was 8,600 lb. at 6,198 ft.

Present when the deep spudder depth was reached in Gibson County, Indiana, were: Henry C. Neely, Bucyrus-Erie drill sales representative; Leavitt E. Gray, drilling contractor; Gerry Litherland, general superintendent for R. D. Brown, Inc., the lease holder; Lon Welch, Wheeling, helper; Ben Cunningham, Princeton, driller

QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Simplified Flow Diagrams

Ethyl Alcohol from Ethylene

ALTHOUGH ethyl alcohol has been manufactured in large quantities from ethylene by the Compagnie de Bethune in France and Carbide and Chemicals Corp., notably during the war for the manufacture of synthetic rubber, only during the last 2 years has an oil refinery been manufacturing alcohol. Standard Oil Co. of New Jersey in its Baton Rouge plant, produces a uniform ethylene gas by operation of a special cracking plant to which is fed a mixture of ethane and propane. Alcohol can be produced more cheaply from ethylene than by fermentation. The general theory and chemistry of the esterification of ethylene with sulfuric acid and the subsequent hydrolysis of monoethyl and diethyl sulfates into alcohol and dilute sulfuric acid have long been known (see Chap. 13, Chemistry of Petroleum Derivatives, Vol. 2, Ellis, Reinhold Publishing Corp., New York, 1937, entitled, "Production of Ethyl Alcohol from Ethylene," pages 319-355). Most generally, the chemical reactions may be expressed as:

Esterification—

$$C_2H_4 + H_2SO_4 = C_2H_5O \cdot SO_3H$$

or $$2C_2H_4 + H_2SO_4 = (C_2H_5O)_2SO_2$$

Hydrolysis—

$$C_2H_5O \cdot SO_3H + H_2O = C_2H_5OH + H_2SO_4$$

or $$(C_2H_5O)_2SO_2 + H_2O = C_2H_5O \cdot SO_3H + C_2H_5OH$$

Ether production—

$$(C_2H_5O)_2SO_2 + C_2H_5OH = (C_2H_5)_2O + C_2H_5O \cdot SO_3H$$

Plant processing operations consist of the following general steps:

1. Purification of ethylene, particularly for the removal of higher olefins such as propylene by fractionation, contacting with 80-85 per cent acid, etc.

2. Esterification of ethylene with 92 per cent sulfuric acid in an absorber-like tower.

3. Hydrolysis with water at a high temperature so that the alcohol formed will be rapidly vaporized and thus will not promote the ether-forming reaction.

4. Strip the spent acid of alcohol by means of steam and send the weak acid to a concentration system for reuse.

5. Caustic wash the crude alcohol vapors to remove acidic materials.

6. Fractionate ether from the crude alcohol and absorb the alcohol vapor from the ether vapor.

7. Remove water from the dilute alcohol by fractionation.

These operations are shown diagrammatically in Fig. 1. A review of the Standard Oil Co. plant was published on page 96 of the November 1945 issue of Chemical and Metallurgical Engineering.

Lauson Engine Test Conditions

I should like to have information on the "Lauson engine test" as it is used in rating lube oils and additives. What is the test procedure and what method is used in loading the engine? Do the results bear any relation to a 36-hour Chevrolet test?—C. S. L.

Not much detailed information is readily available to use on Lauson engine testing but such information can be had from the chairman of bench test subcommittee of the crankcase-oil-stability research committee of the Society of Automotive Engineers (29 W. 39th St., N. Y.).

In reporting upon the work of the subcommittee in 1943, Chairman C. W. George in the February 1943, p. 52 issue of the Journal of the Society of Automotive Engineers, tells of results with the Lauson engine as well as results obtained with the Underwood and several other engines or tests. Operating conditions on the engine ranged as follows:

R.p.m.	1,200-1,800
Test time, hours	25-44
Load, hp.	1-3
Oil temp., °F.	212-320
Jacket temp., °F.	170-400

Among this range of test conditions (15 laboratories) several laboratories selected the following operating conditions as most suitable for each type of testing:

For oil stability and bearing corrosion:

Oil temp., °F.	280
Coolant temp., °F.	180-200
Test time, hours	100-120
Engine speed, r.p.m.	1,600-1,800
Load, hp.	1.3-1.6

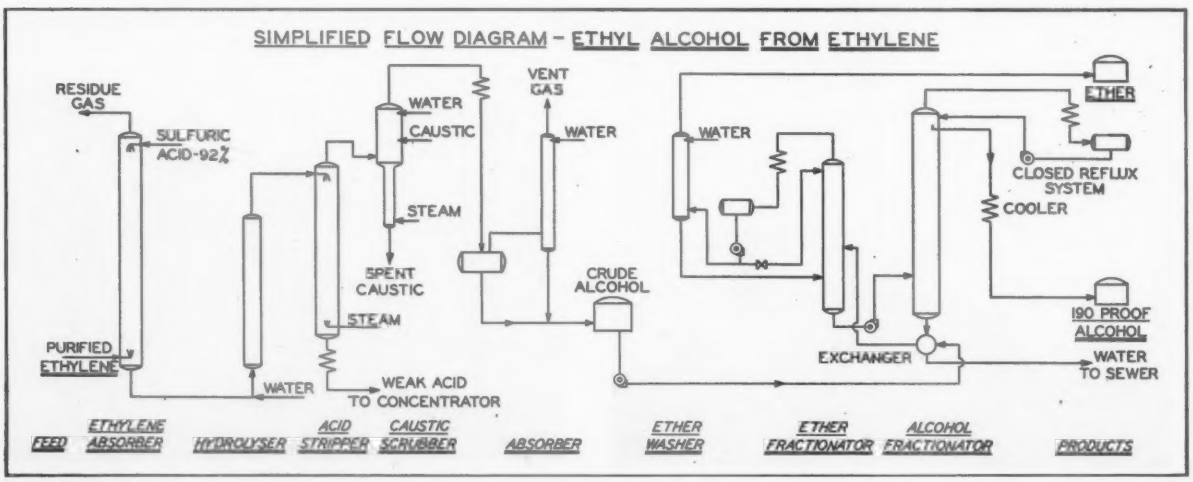
For detergency and bearing corrosion:

Oil temp., °F.	225
Coolant temp., °F.	345-350
Test time, hours	100-120
Engine speed, r.p.m.	1,600-1,800
Load, hp.	1.3-1.6

Accelerated for ring sticking and detergency:

Oil temp., °F.	225
Coolant temp., °F.	400
Test time, hours	24-48
Engine speed, r.p.m.	1,600-1,800
Load, hp.	1.3-1.6

When using suitable operating conditions the Lauson test rates oils as to their stability, bearing corrosion, de-



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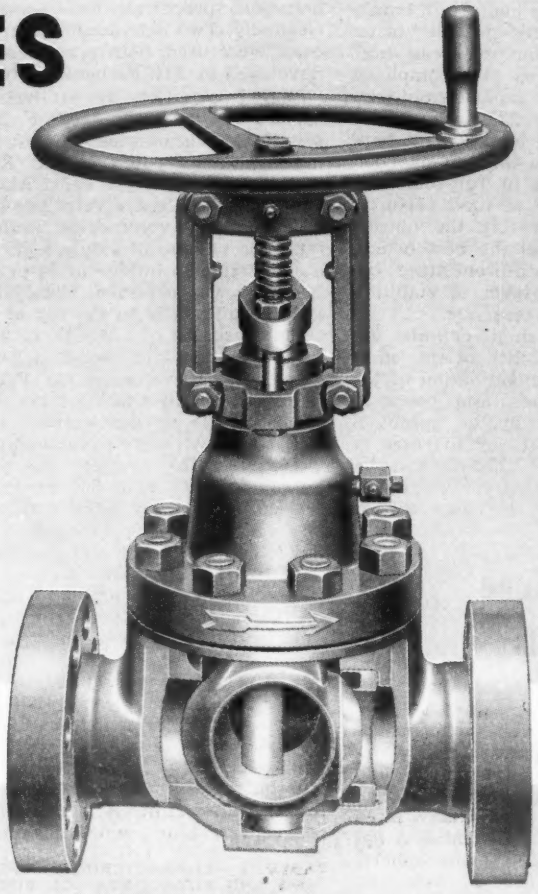

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tergency, and ring-sticking properties in line with full-scale Chevrolet-engine tests. Engine speed and load seem to be of little significance except that mechanical failures are frequent at full (3 hp.) load. High crankcase-oil temperatures promote instability and oxidation whereas high coolant temperatures place emphasis upon detergency. Crankcase-oil temperature exceeding 280° F., or both high crankcase and high coolant temperatures, will rate any oil as poor. Perfect duplication of full-scale engine test results or of road performance is not possible but the Lauson test is considered as the best bench-scale method of differentiating between oils with respect to stability, corrosiveness, or detergency.

The Lauson is a single-cylinder engine and the suitability of the oil is judged mainly by examination of the cylinder walls, rings, and bearings. Corrosion is judged by the weight of the bearings, stability by the area of piston covered with varnish, and detergency and ring sticking by the general condition of the rings and the piston.

German Wartime Aviation Fuels

(Continued from page 93)

three plants—Leuna, Ludwigshaven-Oppau, and Heydebrek—using isobutylene made as follows: Isobutyl alcohol was synthesized from CO and H_2, a variant of the Fischer-Tropsch reaction. This alcohol was dehydrated to the olefin by alumina catalyst operated at essentially atmospheric pressures and 630°-680° F., obtaining 95 per cent conversion to olefin with a small amount of isobutyraldehyde, using a one-pass operation. A simple distillation removes the water and aldehyde; the aldehyde is hydrogenated to the alcohol again and recycled to the reaction vessel.

The isobutylene is compressed to 300 psi., heated to 300°-350° F. and passed over a catalyst of 25 per cent phosphoric acid on activated carbon and is there polymerized to isooctene —dimer—and trimer, separating and recycling the unreacted olefin, and eliminating heavy byproducts as fractionating tower bottoms. The main fraction is hydrogenated at 3,000 psi. and 660° F. using a tungsten-nickel-sulfide catalyst. Hydrogen recycle in the ratio of 4 to 1, based on fresh hydrogen, is used. Unleaded octane number is 98, Motor Method, and 115 with 4.35 cc. of TEL.

Alkylation Methods

Commercial-scale production of alkylate in Germany did not materialize until 1943. Plants at Leuna, Politz, and Scholven earlier were making isobutene by dehydrogenation of isobutane, later shifted to normal butane as charge stock. In 1944 four other plants started building in Wesseling, Brüx, Blechhammer, and Bohlen, which did not get into production. Dehydrogenation and also isomerization processes were used in Germany. Two dehydrogenation processes were used, both processes being developed by I.G. Farbenindustrie.

Dehydrogenation by catalysis was carried out at 1,020°-1,100° F. at approximately atmospheric pressure using a catalyst composed of: K_2O, 2 per cent; Cr_2O_3, 8 per cent; Al_2O_3, 90 per cent. With space velocities of the order of eight volumes of liquid butane per volume of catalyst per hour a conversion to butene of 18 per cent per pass was obtained. Catalyst was added continually to the top of a reactor consisting of a bundle of 2½-in. tubes around which hot flue gas circulated at a temperature 200° F. above that of the catalyst in the tubes. These tubes were 17 per cent chrome, 17 per cent nickel with some stabilizing molybdenum. The catalyst was passed through the tube in 200 hours, and carried 2.5 per cent carbon, which was reduced to 1.5 per cent by partial burning with air and the catalyst returned to the reaction zone. Regeneration temperature was held at or below the reaction temperature. Both normal and isobutane were dehydrogenated at the same temperature range, with normal butane held at the top of the range, 1,100° F., while the isomer was held at 1,020° F.

After removing methane, hydrogen, and other light byproducts, the butane-butene mixture goes directly to the alkylation unit. A loss of about 5 per cent is found when forming 18 per cent of olefins per pass, which shows an ultimate conversion of 78 per cent to C_4 olefins. This process was adopted after studying the same reaction under hydrogen pressure, which was eliminated, doubtless due in great measure to the difficulty of obtaining high-pressure equipment during the war.

TABLE 3 — CHARACTERISTIC OPERATING AND YIELD DATA FOR BUTYLENE ALKYLATION PLANTS

Reactor feed composition—	
Isobutane, per cent wt.	54.8
n-Butane, per cent wt.	34.0
n-Butylene, per cent wt.*	4.3
Propane, per cent wt.	6.9
Ratio isobutane to olefin in feed	13
Reactor operating variables—	
Pressure, atms.	1.5
Temperature, °F.	32
Fresh H_2SO_4 feed, per cent wt. acid	98
H_2SO_4 in reactor acid phase, per cent wt.	90-92
Acid to hydrocarbon volume ratio	0.8 to 1.1
Acid consumption, lb. H_2SO_4/gal. of aviation alkylate	0.80
Ratio isobutane to olefin in reactor	ca. 95
Yields and product quality—	
Volumes isobutane consumed per volume olefin feed	1.32
Volumes aviation alkylate produced per volume olefin feed	1.75
Octane number (Motor Method) of aviation alkylate, unleaded	94
Octane number, leaded with 4.35 cc. TEL/gallon	110
Aviation alkylate, per cent volume of total debutanized alkylate	93.5
Composition of aviation alkylate, per cent volume:	
2,3-dimethyl butane	6
2,4-dimethyl pentane	6
2,2,4-trimethyl pentane	21
2,3,4-trimethyl pentane	29
2,3,3-trimethyl pentane	28
Nonanes	10

*Of which alpha butylene is 43 per cent and beta butylene is 57 per cent.

After some experimental work in synthesizing triptane by the Grignard reaction, the Germans attempted to make triptane by making i-propyl chloride and reacting it with isobutane. Propane was treated with molecular chlorine in a vertical tube down the axis of which a mercury arc extended to give ultra-violet light as catalyst. The product was a mixture of the two chloropropanes, after reacting at 300 psi. and a temperature ranging from 70° F. inlet to 140° F. outlet. This mixture was separated to give the 2-propyl chloride which was reacted with i-butane with ultra-violet light and a slurry of $AlCl_3$, in the ratio of one part chloride, one part $AlCl_3$ and five parts isobutane, at 32° F. No triptane was found as product, but a group of isoparaffins boiling from 190° to 370° F., of which about 50 per cent was 2,2,3-trimethylpentane. The major portion of the product boiled between 210° and 230° F., with a lean-mixture rating of 96-98 octane number and a rich-mixture performance higher than standard 2,2,4-trimethylpentane, or isooctane. Later it was found that chloropropane-1 was as good as isopropyl chloride or chloropropane-2, and the mixture was no longer separated. An over-all yield of 80 per cent was obtained, and the product was named "Peroptan." A large-scale plant was designed but never built. I-butyl chloride and also ter-butyl chloride were reacted with i-butane but no 2,2,3,3-tetramethylbutane was found as product. Ethyl chloride and i-butane were treated in similar manner but could not be induced to react to release HCl,

Peroptan Synthesis of Triptane

The alkylation plants as designed in Germany varied somewhat from American practice. Autorefrigeration of the reactor was employed in the units, by evaporation of C_4 until the chilled liquid was returned to the reaction zone. In some cases the reactor was a stirred autoclave with no external recycle. The isobutane used was practically pure. In other cases a reactor system was used in which acid catalyst - hydrocarbon emulsion was recycled, part of the mixture withdrawn to a settling vessel continuously. Spent sulfuric acid, catalyst, was recovered by diluting to 50 per cent concentration and separating the oily tar layer, later reconcentrating the dilute acid layer to 93-94 per cent and then fortifying it to 98 per cent H_2SO_4 by adding SO_3. Typical operation and yield data are shown in Table 3.

therefore the alkylation reaction was not completed.

Isomerization of N-Paraffins

Four n-butane isomerization plants were operating in Germany, the operation differing little from that used in the U. S. A., a vapor-phase process with $AlCl_3$ as contact catalyst. Reaction was carried out at 200°-210° F. and 16 atmospheres (241 psi.). Ten per cent of HCl was added to the butane feed to the reactor, the catalyst was charged in lumps; an hourly space velocity of three was maintained, obtaining a 30 per cent conversion per pass, and recovering 96 per cent of the charge. $AlCl_3$ consumption was 1.2 weight per cent based on n-butane feed, HCl used up was 0.6 per cent. Raising the reaction temperature to 210° F. raised conversion to 40 per cent, but used up more catalyst and the C_4 recovery dropped to 95 per cent.

Design of the reactor assembly included a vertical column, partially filled with Raschig rings. Atop this section the lump $AlCl_3$ was placed; charge n-butane plus HCl entered at the bottom and passed upward, and catalyst-hydrocarbon complexes were formed. These complex products fluidized and flowed down over the Raschig rings, making for more intimate contact with the charge. By designing the size of the tower, depth of ring section and by controlling the charge rate the fluid catalyst exiting from the tower bottom was entirely spent. In spite of free space left in the reactor above the catalyst bed, catalyst was carried over and plugged condenser tubes, the report states.

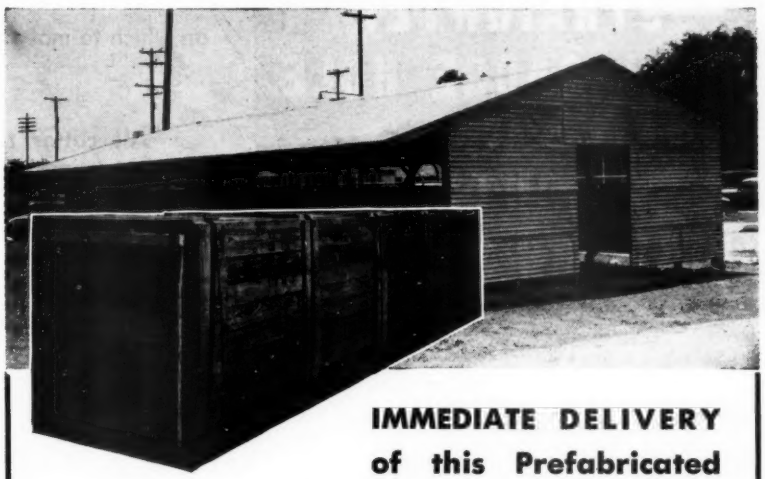
Chrome-nickel steels were desired for the system but with plain carbon steel as the only available ferrous metal, some corrosion was experienced until more careful drying of the charge minimized corrosive tendencies.

No commercial pentane isomerization was practiced in Germany but some work was carried out by the K. W. Institut in C_6 isomerization. Normal hexane was charged, under 50 atmospheres (750 psi.) pressure and 160°-175° F., to an $AlCl_3$ catalyst with 30 per cent of its weight of HCl added. This system added antimony trichloride or chlorinated hydrocarbons to obtain a liquid catalyst at the temperature employed for reaction. A 5-hour contact time showed 70 per cent conversion. Product showed 15 weight per cent neohexane, (2,2-dimethylbutane), 10 per cent, 2,3-dimethylbutane, 10 per cent 3-methylpentane, 15 per cent 2-methylpentane, 20 per cent of C_4's, C_5's, etc., with 30 per cent unconverted C_6's.

Since high hydrogen pressure and low temperature shows less cracking of charge but requires longer reaction time, experiments with 1,500 psi. hydrogen pressure, 160°-175° F., and 0.2 mols $AlCl_3$ and 2.0 mols of HCl per mol of normal hexane, and reaction time of 18 hours showed a 90 weight per cent conversion to isomers. Analogous treatment of heptane, and even up to several hundred atmospheres pressure, showed extensive cracking in the presence of $AlCl_3$. Further, cyclohexane was treated with 15 weight per cent of $AlCl_3$ and 7 weight per cent of anhydrous HCl under 2,250 psi. of hydrogen and 210° F. temperature. The results showed after 6 hours' contact time a product of 1 weight per cent i-butane, 20 per cent 2,2-dimethylbutane, 6 per cent 2,3-dimethylbutane, 18 per cent of mixed 2- and 3-methylpentanes and small amounts of other byproducts along with the remainder of unconverted cyclohexane. A German patent application states that the $AlCl_3$ can be recovered virtually unchanged.

Synthesis of Aromatics and of Base Stocks

At least 85 per cent of all German aviation fuels were made up of base stocks, most of which were derived directly from coal and coal tar through destructive hydrogenation. This operation was divided into three steps, the first being bulk destructive distillation of coal to make tar; next the purification of this tar as a preliminary; and finally the "fine" hydrogenation of this purified tar to produce only gasoline, plus other products which were recycled back



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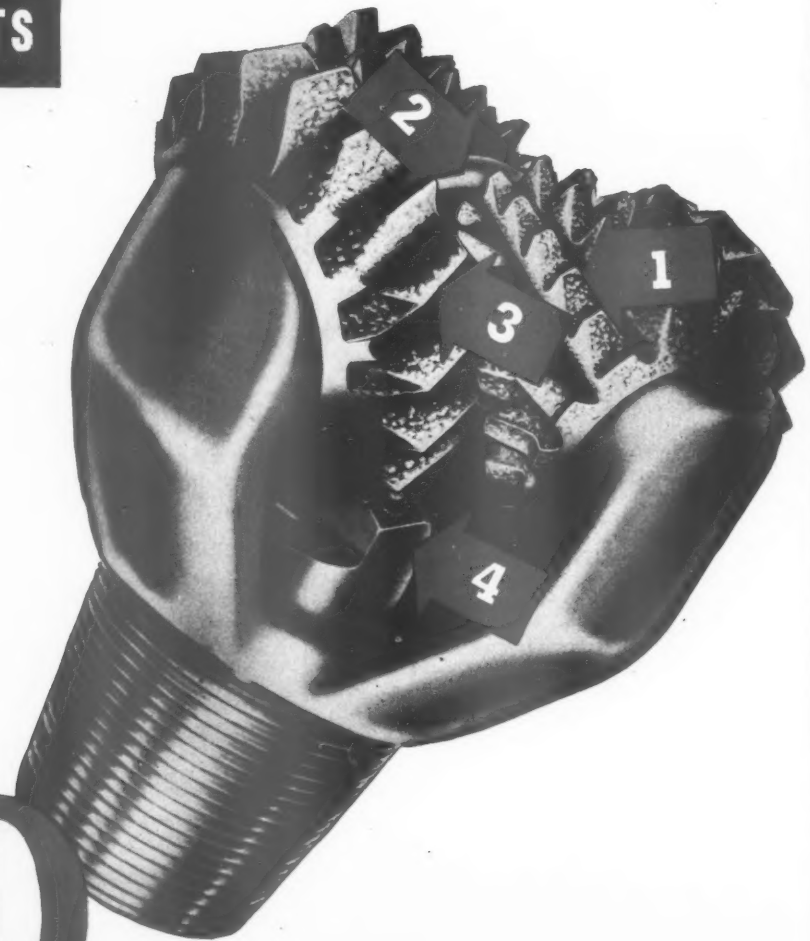

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to the reactor to convert all of it eventually into aviation-base stocks. Only 15 per cent of alkylates were used in C-3 aviation fuel, none in B-4 fuel. Only a very small per cent of petroleum-derived material was incorporated in finished aviation fuels. Table 4 shows typical properties of these B-4 gasolines.

Distillate from the hydrogenation of coal-tar pitch was treated at 700 atmospheres (10,500 psi.) and 930° F. in one step with a new catalyst containing lead, molybdenum, and chromium supported on an inert carrier. A 350° F. e.p. gasoline was formed containing 40-45 per cent aromatics which became base stock for C-3 fuel which showed 80 octane number unleaded and 92 with 4.35 cc. of TEL. The most important method used was known as the D.H.D. Process of which four plants were operating at the war's end, with 20,000 bbl. per day combined input capacity. Ten others were planned but never built. High-naphthene-content fuels (gasolines) preferably from stein coal or its tars, were processed. Tars from brown coal were also processed successfully by changing conditions to cause cyclization of paraffins present in large percentages in the latter. About 15 per cent of the light ends of the 360° F. e.p. charge was distilled off, containing no naphthenes and boiling up to about 160° F. and the remainder was charged to preheaters and into the first of five reactors at 930° F. and 375 psi. of which 150 psi. was hydrogen pressure, for brown coal tar gasoline charge. For stein coal products the conditions were 750 psi. of which 525 psi. was hydrogen.

The catalyst was made by precipitating Al_2O_3 from "tonerde" (hydrated natural alumina), mixed with 10 per cent of molybdic oxide, MoO_3, and pelletized into ½-in. cubes. Endothermic heat of the aromatizing or cyclicizing reaction reduced the entrance temperature of 930° to 840° F. at exit, the flow entering the top of the reactor and passing downward; therefore the stream was heated before passing into each of the series of reactors. Temperature in the fourth reactor was raised to 950° F. and reduced to 930° in passing through, then to 970° F. before entering the last or fifth reactor. In a sixth reactor at about 650° F. filled with D.H.D. catalyst except the lowest fifth which held Florida earth, olefins were saturated. After 40 hours on brown coal tar, or 250 hours on stein coal tar, the carbon was burned from the catalyst, recycling flue gases with air to control temperature to not higher than 1,030 F. This required 20 to 24 hours' time. Carbon deposition under these conditions was about 1 per cent of the brown coal gasoline charged, about 0.1 per cent of the stein coal charge stock. Sulfur is a catalyst poison in this case, but troublesome only when treating crude-oil fractions. The life of the catalyst was at least a year. Finished aviation-fuel base stock was 75 to 85 per cent of the stock charged, the higher yields coming from stein coal tar gasolines.

TABLE 4—PROPERTIES OF B-4 BASE STOCKS FROM HIGH-PRESSURE HYDROGENATION PLANTS

Feed to hydrogenation B-4 base stock—	Brown coal	Stein coal	Brown coal tar	Stein coal tar
Density at 59° F.	0.723	0.730	0.725	0.725
Volume per cent distilled at 212° F.	65	57	58	65
End point, °F.	270	308	302	320
Paraffin content, per cent volume	53	40	60	37
Naphthene content, per cent volume	42	52	30	55
Aromatic and olefin content, per cent volume	5	8	10	8
Octane number, Motor Method, unleaded	71	73	69	76
Octane number, Motor Method, with 4.35 cc. TEL/gallon	90	91	89	94

Average properties of the aromatized product so made show 0.780 specific gravity, 48 per cent distilled at 212° F., e.p., 340° F.; paraffins, 30 volume per cent; naphthenes, 20 per cent, and aromatics, 50 per cent. Of olefins less than 0.5 per cent is found

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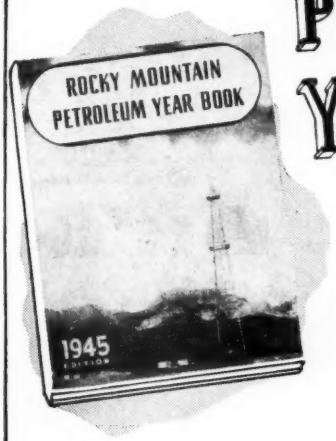

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typically. Octane number of the residue after extracting aromatics was 70, Motor Method.

Hydroforming and Alkyl Aromatics Synthesis

Two hydroforming units were operated in Germany, processing both Romanian and Austrian crude-oil fractions, usually those boiling between 140° and 330° F. The information for these processes was obtained from the U. S. A. The process operated at 225-450 psi., of which 65-70 per cent was hydrogen pressure, and at 930° F., space velocity 0.5 with a catalyst of 5-10 per cent MoO_3 on alumina. Operating cycle was 17-30 hours, with 9 hours required for catalyst regeneration. The product, properties of which are shown in part in Table 5, was used as base stock for C-3 aviation fuel.

Diethylbenzene was the only alkyl aromatic synthesized commercially in Germany during the war. As a styrene byproduct about 300 bbl. per day of this material was made by I.G., named Kybol. No cumene was made commercially.

A new process not applied on a large scale, called the "Arobin Process," was planned to dealkylate high-boiling aromatics to reduce them to the gasoline boiling range. Aromatic residues boiling from 340° to about 600° F. were to be treated with a catalyst of synthetic aluminum silicate in which 1 weight per cent of molybdic oxide was incorporated, at 750°-780° F. and a hydrogen pressure of 300 psi. and space velocity of one volume including recycle. A yield of 85-87 per cent by weight was obtained it was claimed, containing 70 volume per cent of aromatics, e.p., of 330° F. for the whole. Three per cent of hydrogen by weight of gasoline is consumed, it is claimed, in the process. High hydrogen pressure is said to have prevented any appreciable coke deposit on the catalyst, resulting in several hundred hours on stream. Details of product are shown in Table 6.

TABLE 5 — YIELD AND ANALYTICAL DATA ON MOOSBIERBAUM HYDROFORMING OF STRAIGHTRUN GASOLINES

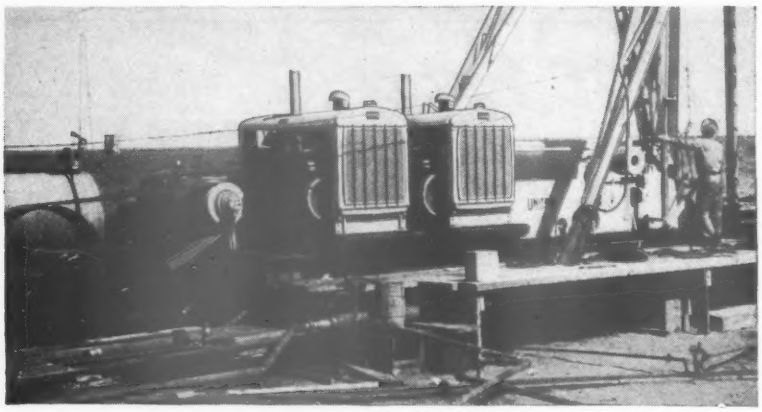
Yield data—	Feed	Product
Gasoline, % wt.	100.0	79.0
C_1 plus C_2 plus C_3, % wt.	....	11.0
Isobutane, % wt.	....	1.3
Normal butane, % wt.	....	2.7
Analytical data—		
Density at 68° F.	0.750	0.776
Distillation, °F., i.b.p.	144	112
Distillation, °F., end point	330	330
Distilled at 212° F., % volume	18	36
Distilled at 320° F., % volume	95	94
Olefin content, % volume	0.5	1.5
Aromatic content, % volume	14	54
Naphthene content, % volume	44	8
Reid vapor pressure, lb.	5.3	5.1
Octane No., Motor Method, unleaded	58	80
Octane No., Motor Method, with 4.35 cc. TEL/gallon	79	91

TABLE 6 — YIELD AND ANALYTICAL DATA ON FEED AND PRODUCTS OF AROBIN PROCESS

Yield, % wt.—	Feed	Product
Gasoline	100.0	85.7 to 87
Methane	....	0.2 to 0.3
Ethane	....	1.7 to 2.0
Propane	....	4.8 to 5.2
Isobutane	....	3.8 to 4.2
Normal butane	....	2.4 to 2.6
Analytical data—		
Density at 68° F.	0.91	0.807
Distillation, °F., i.b.p.	340	120
50 per cent	380	260
e.p.	600	330
Aromatic content, % volume	95	65
Naphthene content, % vol.	....	27
Paraffin content, % volume	....	8
Bromine number	ca.8	0.8
Octane number, Motor Method, unleaded	....	86
Octane number, Motor Method, with 4.35 cc. TEL/gal.	....	93.5

Catalytic Cracking

No commercial catalytic cracking was carried out in Germany although one process had been developed, similar to the Thermofor process used in the U. S. A. It was planned to operate on gas oils, at 840° F. using spherical pelleted catalyst of silica-alumina containing 15 per cent SiO_2. The operation planned to convert 50 per cent of the charge per pass, and give a 30 per cent yield—on charge—of a 340° F. e.p. distillate suitable without further treating as C-3 base stock. A coke yield of 4 per cent was expected when employing a space velocity of p.6 volumes of charge. Only one ele-



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Baash-Ross News

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OUR 26th YEAR

PREVIOUS DESIGN
Split cover screwed onto body by large-diameter thread
NEW DESIGN
Solid one-piece cover simply drops on body and is held by removable "J" bolts and safety lock nuts.
NEW SOLID COVER is Stronger and Eliminates Large-Diameter Threads!

NEW TYPE COVER

further minimizes maintenance on the famous BAASH-ROSS ROLLER KELLY BUSHING!

Baash-Ross Roller Kelly Bushings have long been famous for the two important advantages they offer over conventional kelly drive bushings . . .

1 **The effortless friction-free driving contact they provide between kelly and table.** Regardless of the table speed—even speeds as high as 1000 r.p.m.—and regardless of the driving pressure between table and kelly, the Baash-Ross Roller Kelly Bushing permits smooth frictionless kelly feed and accurate bit control *at all times.*

2 **The unusually low maintenance and servicing they require.** Unlike conventional bushings that have high-friction sliding contact with the kelly, the *rolling* contact of the Baash-Ross Roller Kelly Bushing reduces wear and maintenance to a minimum.

We haven't yet found a way to improve on the smooth, accurate bit control and instant feed you get with the Baash-Ross Roller Kelly Bushing . . . but we have incorporated a new type cover on the Roller Bushing that *further* simplifies maintenance of the unit.

In place of the split cover formerly used which was screwed on to the body by means of a large-diameter thread, the cover is now *one solid piece* that simply drops in place on the body and is held there by "J" bolts equipped with safety lock nuts that will not loosen under the most severe vibration—yet are quickly removable when desired. Here are the advantages of this new design. . .

• **Negligible Maintenance.** Formerly, if the large-diameter thread should become damaged, it was necessary to take the Bushing off the rig and transport it to a machine shop suitably equipped for re-cutting this large-diameter thread. But with the new construction there is no need to even remove the Bushing from the table, let alone take it to a machine shop for thread re-cutting. An extra supply of inexpensive "J" bolts can be kept right at the rig and any damaged ones instantly replaced. Or in emergencies, a suitable bolt can be quickly made by cutting down the head on an ordinary bolt. It's as simple as that!

• **Greater Strength.** The new solid cover, besides having no threads to maintain, is unusually strong, providing an additional margin of safety to withstand the extreme centrifugal forces of high rotational speeds.

• **Completely Streamlined.** All bolts are recessed flush with the surface. There are no projections to catch in cat-line, equipment or workmen's clothing.

This new cover design is one more step in the continuous program of product improvement that characterizes all Baash-Ross equipment . . . a program that insures you the ultimate in operating efficiency, convenience and simplicity in every product bearing the Baash-Ross name!

YOU MAKE A 6-WAY SAVING with BAASH-ROSS ROLLER KELLY BUSHINGS!

Operators tell us probably no single piece of drilling equipment has equalled the multiple savings they started making after switching to Baash-Ross *Roller* Kelly Bushings. By eliminating the erratic bit feed and sudden destructive "feed-offs" inherent in conventional kelly drive bushings, the smooth frictionless feed of the Baash-Ross Roller Bushing gives. . .

1. More accurate weight indication. With a *roller* bushing there is no friction to hold up the kelly, therefore nothing to interfere with instant, accurate weight indications.

2. More footage per bit. The sensitive bit control you get with a *roller* bushing keeps the bit digging at a uniform rate, assuring faster drilling speed, more footage per bit.

3. Freedom from binding. The rollers prevent binding of the kelly at all table speeds—even at speeds as high as 1000 r.p.m.—regardless of "driving pressure" against the kelly.

4. Longer kelly and drill string The smooth steady feed of a Baash-Ross Roller Bushing eliminates sudden twisting strains that shorten drill string and kelly life.

5. Longer rotary equipment life. Sudden impacts that damage rotary table bearings, swivel bearings and other rig equipment are eliminated by the smooth feed of a *roller* bushing.

6. Reduced risk of twist-offs. The sensitive *roller* bushing feed eliminates the sudden torsional strains in the string that cause twist-offs and damaged threads.

Baash Ross Roller Kelly Drive Bushings are available in sizes to fit all popular kellys from 2 1/2" to 6" in the square type . . . and from 3" to 7" in the hexagonal type. Each size Bushing can be quickly adapted to a wide range of kelly sizes by simply changing the roller assemblies. This minimizes inventories and simplifies changing from one kelly size to another.

Get all the facts on the multiple savings Baash Ross Roller Kelly Bushings will make on your operations by contacting your nearest Baash Ross representative. Or write direct for further details.

vator was planned, the regenerator being placed immediately above the reactor section.

Test data on an operation on gas oil, cracking it at 790° F. and 0.5 space velocity show a 36 per cent yield of 330° F. gasoline with 20 per cent aromatics and 4 weight per cent olefins, and with an octane number, clear, of 75, with 4.35 cc. TEL it showed 94 octane number. Isobutane was formed in 3.1 per cent yield. German technologists believe that catalytic cracking is not applicable generally to coal tars, etc., because of high coke deposit on the catalyst.

The Ruhr-Chemie process planned to crack oils catalytically, especially highly paraffinic Fischer-Tropsch products, to form a maximum of olefins for chemical synthesis intermediates. A synthetic silica-alumina catalyst was used, 0.7 apparent specific density, with a space velocity of 0.1, yielding a 40 per cent conversion per pass on a 340°-660° F. Fischer-Tropsch fraction, of which nearly 70 per cent was olefins up to C_5-, and only 15 per cent gasoline. The process was discontinuous, and catalyst was regenerated after 20-25 minute cycles, showing about 1.5 per cent coke deposition. Product distribution is shown in Table 7.

TABLE 7—YIELD AND PRODUCT COMPOSITION DATA — RUHRCHEMIE CATALYTIC CRACKING

Feed to process is Fischer-Tropsch fraction of 340° to 660° F. boiling range.

Yields of components, % wt. of feed—	
Total conversion	40% wt. of feed
Gasoline (C_6 to ca. 320° F.)	6—8
C_5 Fraction	7.6—9.6
C_4 Fraction	10—12
C_3 Fraction	8—10
C_2 Fraction	2—2.8
Methane and hydrogen	0.4—0.8
Coke	1.2—1.6

Jet-propulsion fuels were being made in Germany at the rate of 1,000 bbl. per day in 1944, being a mixture of gasoline and diesel-fuel fractions. Specifications therefore were broad and lenient.

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BOOKS

GAS ANALYSIS AND TESTING OF GASEOUS MATERIALS. By V. J. Altieri. American Gas Association, 420 Lexington Avenue, New York. 567 pp. To members, $5. Others, $7.50.

This is a comprehensive book of standards for sampling, analyzing, and testing gases and gas mixtures containing varying amounts of liquids and solid dispersoids. The first six chapters cover kinds of materials, local factors, and purpose of work; properties and composition of gases; measurement of quantity and flow; selection of methods of sampling; instrumentation and process control; apparatus and reagents; common operations, and general calculations. The remaining 14 chapters are devoted to specific methods, tests, and facilities showing usefulness of analysis and testing of materials and processes in the gas phase. The book is profusely illustrated and is thoroughly indexed.

INTERNATIONAL CARTELS. By Ervin Hexner. Published by University of North Carolina Press, Chapel Hill. 555 pp. $6.

The author describes the actual workings of many international cartels. The structure of more than 100 such combinations is presented more or less briefly. These relate to commodities such as sugar, steel, petroleum, chemicals, quinine, iodine, nitrates, matches, munitions. Appendices include the complete texts of numerous cartel documents—example, the Dusseldorf Agreement of 1939, International Rail Agreement of 1937, the International Sulfur Agreements of 1934 and 1936, the Tri-Party Agreement of 1936 between British-American-Canadian chemical industries, and the World Copper Agreement of 1935. Considerable attention is devoted to the political repercussions of cartel practices. Suggestions are offered for framing a policy based on alternatives that are attainable. The author is professor of political science and economics at University of North Carolina.

INSTRUMENTS AND PROCESS CONTROL. Published by the New York State Vocational and Practical Arts Association, and prepared in cooperation with Taylor Instruments Companies. Sold by Delmar Publishers, 49 Sheridan Avenue, Albany. 233 pp. $2.75.

This book presents in simple language, basic and detailed information on industrial processes, controller operation and construction control valves, instrument applications, and installation and maintenance. Over 200 line drawings and photographs illustrate the information. The book is plastic-ring bound.

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Heavy-Duty Motor Oils Discussed by A.S.L.E.

THE use of pour-point depressants, oxidation and corrosion inhibitors, and detergents has solved most problems of engine-bearing corrosion, and by keeping heavy-duty engines running clean has kept them in service for much longer periods than formerly, Wilbur G. Perriguey, Standard Oil Co. (N. J.), said at the first meeting of the New York section of American Society of Lubrication Engineers. Perriguey outlined developments in lubricating-oil refining since 1920. At that time the quality of the motor oil depended solely on the crude source; later S.A.E. numbers were adopted. During the 1930s solvent refining was introduced resulting in lower pour points and higher viscosity index oils from a variety of crudes. Engine design favored the use of lower-viscosity oils. About 1940 the use of chemical additives to base stocks became prevalent.

Walter C. Bauer, chief consulting engineer for Briggs Filtration Co., discussing the filtration of lube oils in heavy-duty service, said the maintenance of filtering of oils in real heavy-duty service is not hard where bearing loads and rubbing speeds are double or even triple that which the engineering handbooks state is the limit for safe operation. The same is true where ball bearings, all combinations of plain bearings, overloaded gear trains, pistons and rings under high temperatures are all lubricated with the same oil, if good engineering has been used in applying the lubricant. Plain well-refined lubricating oil, filters large enough to take the full flow demand of the engine, a combination of both adsorbent and absorbent filtering medium, and an occasional check on oil conditions so as to properly schedule replacement of the filter elements reduce engine failures attributable to lubrication failure to practically zero.

Extensive Use of Additives

C. M. Larson, Sinclair Refining Co., said that the use of additives in motor oils has grown in leaps and bounds in recent years, and use of these oils greatly exceeds that of straightrun oils. The severity of service doubles with each 20° F. increase in crankcase temperature. The concentration of the additive should depend upon the time between oil drains. He further stated that the heavy-duty oil is not a cure-all for all lubrication troubles, and also that no satisfactory additive has been developed for airplane engines.

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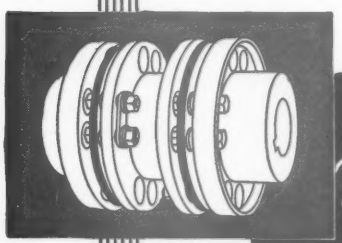

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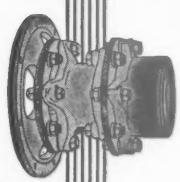

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Early Reinjection Necessary, Dickey Tells Geology Groups

The importance of early reinjection of gas and water to prolong the life of an oil pool was emphasized by Parke A. Dickey, chief geologist of Quaker State Oil Refining Corp., in a series of 12 talks to geologists of the Mid-Continent area.

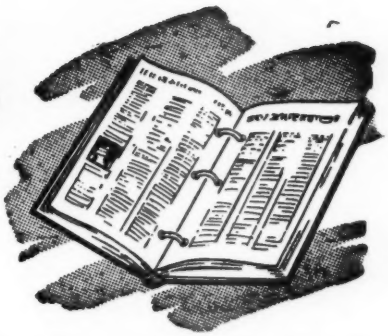
Dickey spoke on "Geology and Secondary Oil Recovery" before affiliated societies of the American Association of Petroleum Geologists under the auspices of the distinguished lecture committee of the national organization. His concluding lecture was in Wichita last week.

"Secondary recovery methods differ from pressure maintenance only in their economic and not in their technologic aspects," he said. "Reinjection of gas and water should begin as early as possible in the life of a pool if maximum recovery and lowest ultimate cost per barrel are to be obtained.

"If secondary methods are too long postponed, the poor mechanical conditions of the wells and the irregular encroachment of water and gas in the sand may make the oil too expensive to recover, and large reserves will be lost. If a company contemplates the operation of a pool for longer than a very few years, it would be wise to take into consideration the overall costs during the life of the pool, which will be vastly reduced by an early reinjection of water or gas."

The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL



Types of Exchangers—Double Pipe

DOUBLE pipe and similar multiple-unit installations can be used for all of the services listed in The Refiner's Notebook No. 80, but they are not easily adapted to the handling of large volumes (mainly vapor) through just one side of the exchanger because of the piping (and danger of leaks) attendant to the use of a large number of units connected in parallel flow. Their main disadvantage is the high cost caused by the relatively large area of shell that must be purchased. They have the advantages of (1) providing almost perfect countercurrent flow (see Notebook No. 77, January 19, 1946); (2) being composed of small units which can be switched from service to service as conditions change, and (3) being able to be cleaned one at a time without greatly disturbing the efficiency of the whole exchanger. The last advantage is expensive because of the cost of the piping and valves required to remove each exchanger from service. The high cost can be moderated somewhat by the use of several tubes in one outside pipe or shell as indicated in Fig. 1. Also shown in Fig. 1 is the use of fin tubes to increase the transfer of heat from the fluid that has the lowest transfer rate. Advantages (1) and (2) listed above are highly practical ones, and coupled with the use of fin tubes, the double-pipe type of construction is becoming very important particularly for small plants or small heat duties, and costs are in line with those of shell-and-tube equipment. For large installations, pressure drop becomes prohibitive (if arranged in pure counter-current flow), or if multiple-stream installation is employed the advantages of the double-pipe installation fail because the flow becomes similar to that in a shell-and-tube-bundle-type exchanger.

Extended Surface

In almost all heat-transfer installations one of the fluids has a poorer heat-transfer rate than the other. This may be compensated by using more surface for the poor-rate fluid. Longitudinal fins are employed if the direction of fluid flow is parallel to the tube, whereas helical fins (around the tube) are used if flow occurs across the tubes. By the judicious use of fins and by careful routing of the fluids, transfer rates (based on the finned surface) of 50 per cent of regular bare-surface rates are common, and rates of 75 per cent of the bare-surface rates are not uncommon. Finned tubes usually exhibit 4 or 5 times as much surface as a bare tube and hence many fewer tubes are required. The use of fins is clearly advantageous for such fluids as air, gas (not condensing), viscous clean oils, liquids being heated with steam, and any fluid whose film-transfer rate is very low compared to that of the other fluid. The use of helical fins in a double-pipe-type exchanger is indicated in Fig. 2.

TENTATIVE SCHEDULE OF TOPICS

No. 77—Shell-and-Tube Passes
No. 78—Heat Duty in Exchangers
No. 79—Caustic-Soda Solutions
No. 80—Shell-and-Tube Exchangers
No. 81—Double-Pipe Exchangers
No. 82—Hydrochloric-Acid Solutions
No. 83—Routing of Fluids
No. 84—Shells and Baffles
No. 85—Alkaline Solutions
No. 86—Exchanger-Tube Materials

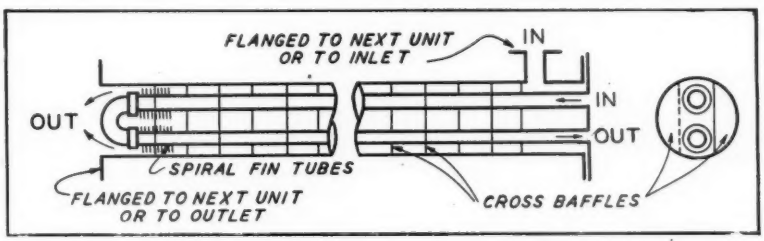


Fig. 2—Double-pipe exchanger with cross baffles and helical fin tubes

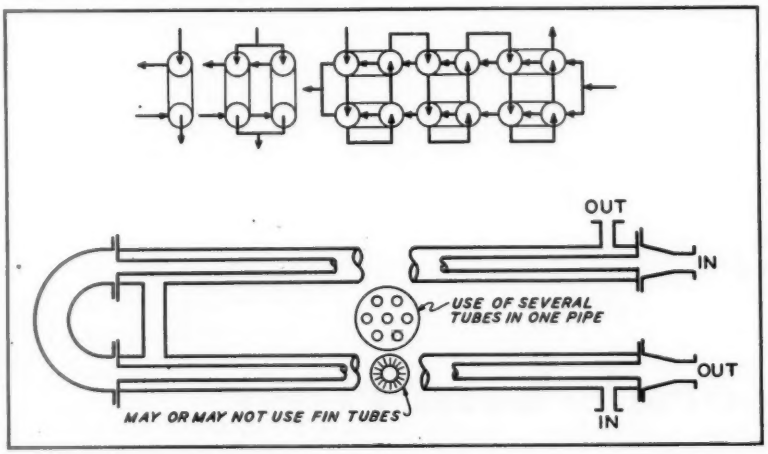


Fig. 1—(Below) Typical double-pipe exchanger and (above) the use of several double-pipe units

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Vapor Pressures of Hydrocarbon Mixtures

VAPOR pressure of a hydrocarbon mixture, at a given temperature, may be calculated when the composition of the mixture and the vapor pressures and weight densities of the components are known. Molecular weights of the components which are also needed in making the calculation may be obtained from a standard table of physical constants of hydrocarbons or, if desired, the values may be computed by the usual methods.

The vapor pressures of each component, at the desired temperature, may be obtained from tables or from a P-T diagram or vapor pressure curve and density values for the particular hydrocarbon from its temperature-density chart. As in the accompanying chart, most temperature density diagrams include data on one or more hydrocarbons. Usually the ordinary plots cover a wider temperature range than that included in the accompanying chart and in many cases density is expressed in pounds per cubic foot instead of pounds per gallon. Any of the common engineering units of volume and weight may be used to express density; however, their use must be consistent in any one set of computations.

When the volumetric composition of a hydrocarbon mixture and the previously specified properties of each of its components are known the calculation of its vapor pressure at a given temperature is a matter of simple arithmetic. In order to reduce the operations in the computation to a minimum the volume per cent analysis figures are assumed to represent gallons or cubic feet as the case may be as determined by the particular chart's density per unit volume values. Under this assumption the volume of the mixture becomes 100 units which is the sum of all of its fractional components. The first step in the computation procedure after setting down the proportionate values of the fractional components is to multiply the density of each component by its fractional part of the total mixture. This operation results in weight per 100 volume units of mixture for each component at the specified temperature. The product of density per unit volume times the fractional value of a component is next divided by the component's molecular weight which quotient is weight mols per 100 volume units of mixture. After this operation is completed separately for each component, all values are added and each value for each component is then divided by the total of all components. The quotient thus obtained for each of the components is called its mol fraction and when all are totaled the sum is equal to 1.

The next step consists of multiplying the mol fraction value of each component by the component's vapor pressure at the specified temperature. Mol fraction values times vapor pressure values result in partial pressure values for each component and are in terms of consistent units according to those obtained from the particular hydrocarbon's vapor-pressure chart or table. For most engineering computations vapor-pressure values are expressed in pounds per square inch absolute pressure.

The sum of partial pressures of all of the components of a mixture is the vapor pressure of the mixture at a given temperature. Partial pressure values for each component divided by the sum of their partial pressures results in the per cent by volume composition of vapor in equilibrium with liquid. All of the values obtained in this last operation when added total 100.

A common method used for computing vapor pressure of a hydrocarbon mixture follows:

Example—Compute the vapor pressure of a mixture which is composed of:

Ethane—00.45 per cent by volume at 76° F.

Propane—27.20 per cent by volume at 76° F.

Butane—72.35 per cent by volume at 76° F.

Solution—See accompanying table.

From the sum of partial pressures in Column 9 the calculated vapor pressures at 76° F. of the mixture is 67.4 psia. pressure.

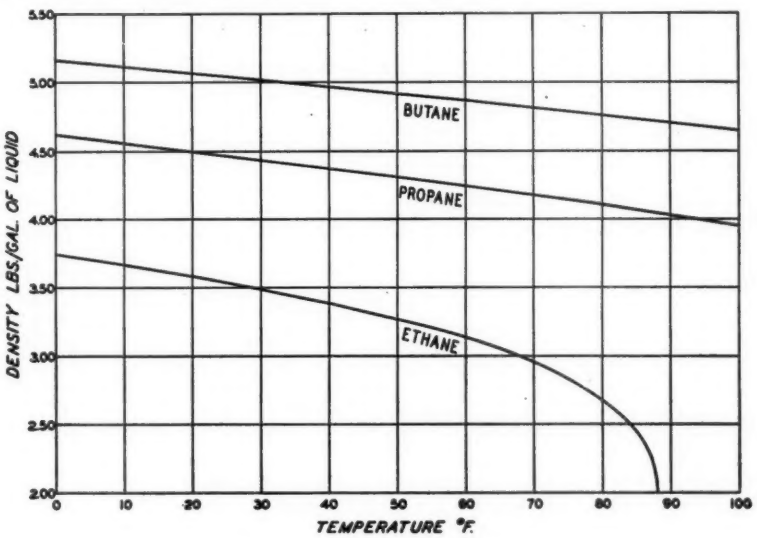

Fig. 1—Temperature-density chart

Component—	Molecular weight	Vol. % at 76° F., gal./100 gal. of mixture	Density at 76° F., lb./gal.	Pounds per 100 gal. of mixture at 70° F.	Pound mols per 100 gal. of mixture	Mol fraction	Vapor pressure at 76° F. psia.	Partial pressure psia.	Vol. % composition of vapor in equilibrium with liquid times 100
Ethane	30.068	00.45	2.767	1.235	0.0417	0.0048	613	2.942	4.363
Propane	44.094	27.20	4.131	112.563	2.5301	0.2965	135	40.028	59.366
Butane	58.120	72.35	4.789	346.484	5.9615	0.6987	35	24.455	36.271
Total		100.00			8.5333	1.0000		67.425	100.000

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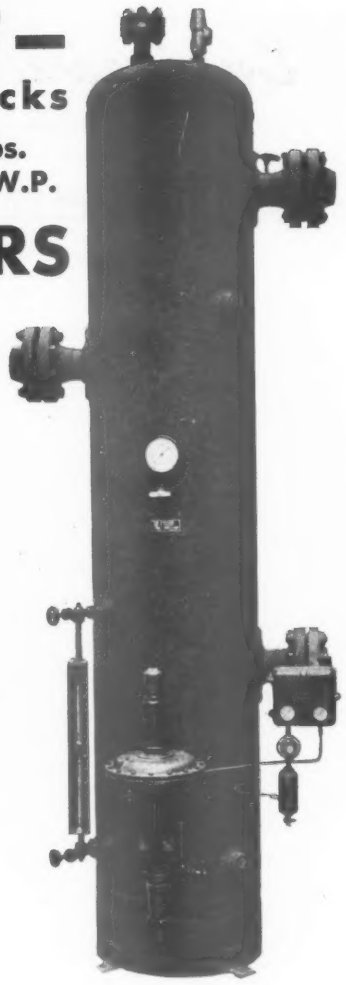

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OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

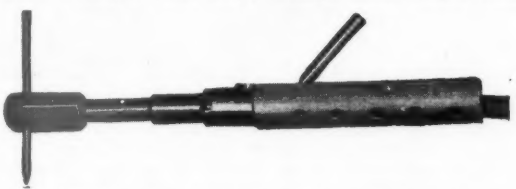
by Joe Cahill

(1) COMPLETE NEW LINE OF METAL PLANES. The first two models, "120" and "140," will be rolling off production lines by March of this year. Will be two-place, high-winged designed and safety engineered for the personal flyer, offering many new features. Constructed of heat treated 24 ST, the new ships are powered with 85-hp.

Continental engines, cruise at 100 m.p.h., and have a guaranteed top speed above 125 m.p.h. Cruising range is 4 hours. New patented safety landing gear is one of the outstanding features. Roomy cabin section; wide adjustable seats; full-vision windshield; large door and side windows; indirectly lighted and shock mounted instrument panel; manually controlled flaps, are features of the new "140." Carries 25 gal. of fuel in two wing tanks. *Cessna Aircraft Corp.*

IT'S NEW CHECK IT

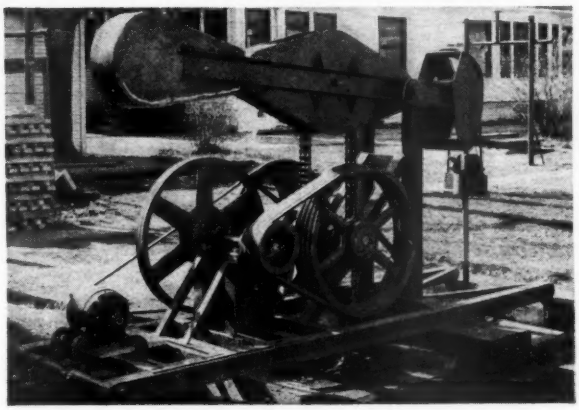
(2) CARBON ELECTRODE HOLDERS. A complete new line of air-cooled carbon electrode holders for manual welding includes four sizes, 150, 200, 300, and 500-amp. models. Positive "Hol-Grip" design with ample length



and ventilation are features. The average carbon arc welding job is done with either the 13½-oz. 150-amp. holder or the 20-oz. 200-amp. unit. Furnished optionally with or without special "Quick-Attach" whip cables for short-duration jobs. The 300 and 500-amp. models are suitable for heavy welding and cutting jobs. *Tweco Products Co.*

IT'S NEW CHECK IT

(3) NOGEAR ALL-V-BELT PUMPING UNIT features automatic intermittent interval pumping. Requires no clocks or other regulating devices. Eliminates pitman arms, pitman-bearings cranks, crank pins, crank-pin bearings,



crank keys, equalizer, equalizer bearings. Operates with pair of sprocket cams and roller chain. Stroke pattern varied by setting the equal ratio cams on their axis. Allows slow filling well to refill between pumping pulls. *Keltner Industries.*

IT'S NEW CHECK IT

(4) PRECIPITATION HARDENING STAINLESS STEEL of the 18-8 type makes available the high strength and corrosion resistance of 18-8 in all wrought and cast forms, regardless of size or shape. Basic composition to insure, without cold working, the approximate completion of the austenite-to-ferrite (martensite) transformation and the subsequent process of precipitation hardening. In the annealed condition Stainless "W" ordinarily has a hardness of 22 to 28 Rc, a tensile strength of 120,000 to 150,000 psi. and a yield strength of 75,000 to 115,000 psi. By proper heat treatment the hardness can be raised to 39 to 47 Rc, the tensile strength to 195,000

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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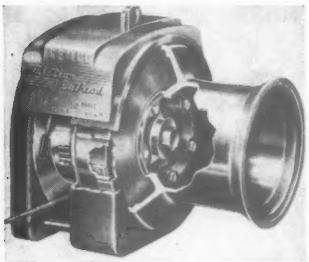
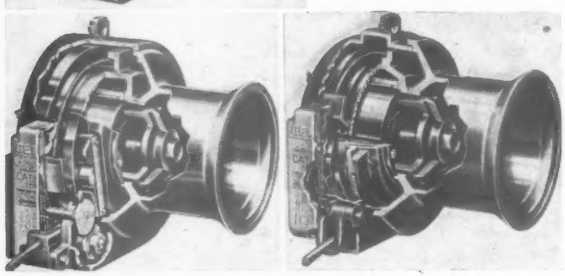
to 225,000 psi. with a yield strength of 180,000 to 210,000 psi. *Carnegie-Illinois Steel Corp.*

IT'S NEW CHECK IT

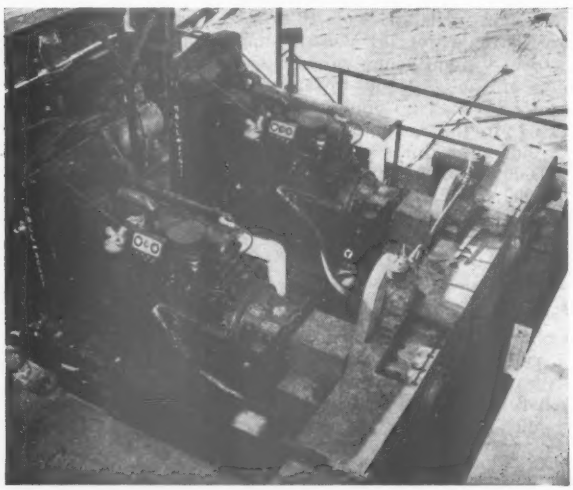
(5) NEW BREAKOUT AND SPINNING CATHEADS consist of a super-automatic positive-clutch-type breakout cathead, automatic positive-clutch-type breakout cathead and 3-in-1 friction-clutch-type breakout, spinning, and combination make-and-break cathead. Each is built around a common base assembly consisting of shaft adapter for adapting to any size or type lineshaft, adapter retainer, roller bearings and spool. On this base assembly may be mounted anyone of the different cathead units thus permitting complete interchangeability of all types. The base assembly is also a complete unit within itself and may be used independently without the cathead unit when doing work requiring only a spool. *Gemco Oil Tools, Inc.*





IT'S NEW CHECK IT

(6) NEW MULTIPLE INSTALLATIONS devised for old-line diesel engines. Now adapted for industrial use these engines deliver power through an hydraulic torque converter to offer flexibility of multiple installation features to oil-field use. Maintains overhead camshaft and valve principle proved in automotive service. Adaptable to natural gas, butane, or gasoline fuels. *Hall-Scott Motor Car. Co.*

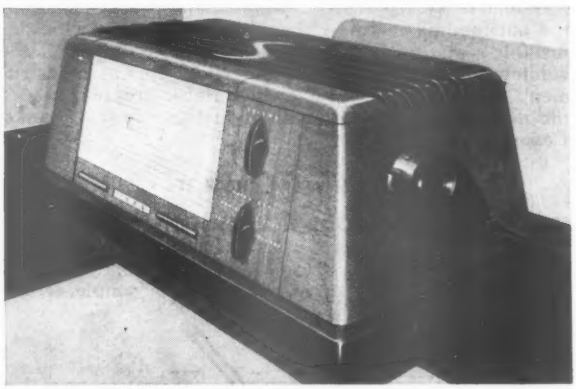


IT'S NEW CHECK IT

(7) NEW STRIPPER WELL PUMP designed for wells which produce from 1 to 10 bbl. Increases production by removing the oil at about the rate it enters the well. Small diameter plunger (D) displaces fluid so slowly that it causes no agitation in the well and lightens the load on rods or surface equipment. Pull tube (K) shields the sealing parts from sand and unseats the pump when it is pulled. Upper and lower valves are fitted with 1¾-in. A.P.I. rib-type balls and seats. Steel plunger is regular equipment. Cro-Lay plungers are available for use in sandy wells and bronze plungers for corrosive wells. *Walter O'Bannon Co.*

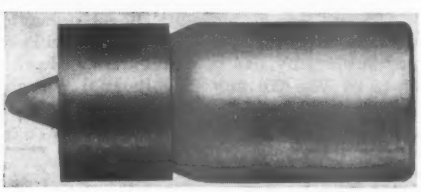
IT'S NEW CHECK IT

(8) SOUND-ON-WIRE Wire recording is now adapted to the requirements of the business office. Wire used in this recording medium is only 0.004 in. thick of a heat-treated, stainless-steel alloy. The recorded result, when played back through a speaker, or headphone, gives a tonal fidelity comparable to any good radio or high-quality phonograph. Uses magnetic "head," instead of carbon poles for impression and reproduction of sound and for erasing the wire for reuse. Erasure is accomplished as the wire travels toward the recording head and cannot be done accidentally. The wire is practically indestructible, and records may be preserved and played back as many times as desired, with no loss of tone or detail. *Standard Business Machines Co.*



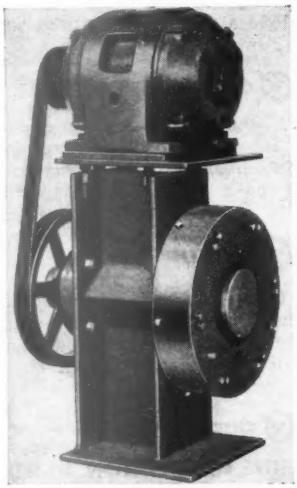
IT'S NEW CHECK IT

(9) A UNIQUE GUN PERFORATING BULLET leaves no harmful burr on the inner wall of the casing to damage packers, testing tools, and other bottom-hole completion



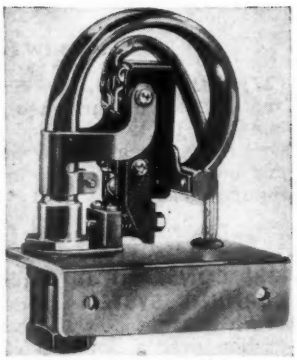
equipment. Consists of a standard bullet fitted with a metal disk which contacts the wall of the casing to prevent the formation of a burr. *Schlumberger Well Surveying Corp.*

IT'S NEW CHECK IT



(10) NEW BOOSTER PUMP gives pressures up to 5,000 psi. with absolute reliability. Simplicity, strength, and precision fit eliminate frequent repairs. Positive displacement. Requires only 4 sq. ft., stands 23 in. high. Available in sizes up to 24 qt. *Martin Wells.*

IT'S NEW CHECK IT

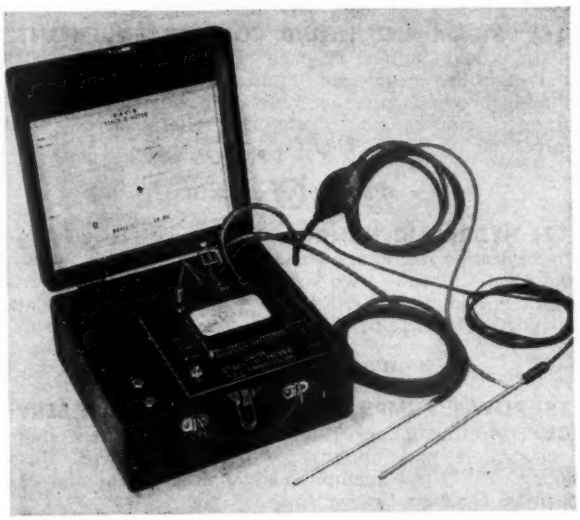


(11) NEW INDUSTRIAL PRESSURE - OPERATED SWITCHES, various models of which will operate from 30 in. of vacuum to 5,000 psi. Unit illustrated incorporates a Micro switch and is suitable for fixed pressure differential applications. Automatically start and stop motors or actuate other related electrical equipment. Custom made with various pressure ports and electrical connectors available. *Meletron Corp.*

IT'S NEW CHECK IT

(12) MUDDLER, NEW MUD GUN, equipped with two surge chambers, completely breaks up weight and mud conditioning materials. It delivers a smooth fluid mixture through the PBX synthetic rubber-lined nozzle. The no-leak handle makes adjustment easy but the gun stays locked in any position from horizontal to vertical and does not spin under highest operating pressures. *Patterson - Ballagh Corp.*

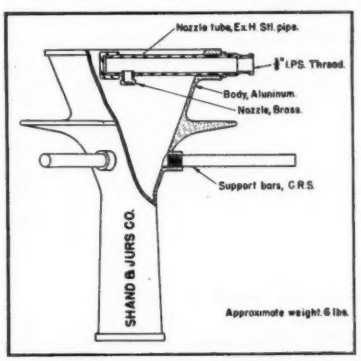
IT'S NEW CHECK IT



(13) NEW STACK ANALYSIS INSTRUMENT for indicating CO_2 stack temperature and draft readings. All readings taken on one meter. CO_2 percentage readings obtained from gas samples collected through a hand aspirator bulb. Stack temperatures read on the same dial, obtained electrically from a thermocouple mounted in the gas sampling tube. Draft measurement is obtained through separate tube, but read on the same meter. Safety switch automatically shuts off battery current on closing the cover of the instrument box. *Davis Emergency Equipment Co.*

IT'S NEW CHECK IT

(14) TANK GAS EXHAUSTER uses compressed air to free truck tanks, compartments, etc., of gas prior to repair, storage, inspection, etc. New unit is a small edition of the large exhausters widely used in gas freeing of petroleum storage tanks at refineries and compartments of oil tankers. Only 18 in. long, weighs 6 lb. Readily portable, has no moving parts to get out of order. *Shand & Jurs Co.*



IT'S NEW CHECK IT

TRADE LITERATURE

(15) PETROLEUM DIGEST OF MAINTENANCE CLEANING describes 88 specific maintenance cleaning and related operations in the producing, refining, and marketing divisions of the industry. It presents, through

tested procedures supplemented by drawings and blueprints, thorough, safe and economical methods and materials for handling varied maintenance cleaning, degreasing, descaling, and other jobs. Each subject is treated individually with practical material and method recommendations made in every case. *Oakite Products,*

IT'S NEW ✓ CHECK IT

(16) "STEAM AND LIQUID CONTROL EQUIPMENT" is the title of a new 40-page catalog which illustrates and describes steam and liquid control equipment, including precision pressure regulating valves, pump governors, temperature regulators, relief valves, float valves, etc. *O. C. Keckley Co.*

IT'S NEW ✓ CHECK IT

(17) HYDRAULIC HANDBOOK. A 60-page booklet giving hydraulic information and tables, conversion factors, and electrical data. Two sections outline manufacturer's facilities and products. Extremely handy reference data for engineers and operating men. *The Aldrich Pump Co.*

IT'S NEW ✓ CHECK IT

(18) POWER PUMPS FOR SLUSH AND CEMENT SERVICE. Operating pictures and cutaway drawings show construction and application of these power slush pumps. The 8-page pamphlet gives descriptions and capacities. *Gardner-Denver Co.*

IT'S NEW ✓ CHECK IT

(19) "MORE POWER TO YOU" is the title of pictorial bulletin put out by engine manufacturer. Maintenance and servicing are stressed with all points fully illustrated. *Buda Engine Co.*

IT'S NEW ✓ CHECK IT

(20) "THE HORTONSPHERE." New 6-page pamphlet describes reduction of evaporation losses from highly volatile liquids by use of this storage method. Charts give correct storage pressures, capacities, and gaging methods. Photographs of three typical units are shown. *Chicago Bridge & Iron Co.*

IT'S NEW ✓ CHECK IT

(21) INDICATING CONTROLLER. A complete description of the purpose, construction, and operation of the Level-Buoy indicating controller is contained in a new bulletin recently issued by the manufacturer. Some features of the instrument are pointer indication of level which is entirely mechanical and independent of controller air supply, no packing glands, ground joint seals, internal pivots, or wearing surfaces are involved. Standard ranges are 14, 32, 60 and 120 in. of water. Ranges of 48, 72, 84, 96 and 108 in. are available. *Taylor Instrument Companies.*

IT'S NEW ✓ CHECK IT

(22) ENGINEERED FILTRATION. New catalog just released covers entire line of fluid and air filters. Pictures and specifications of all sizes, from small air line to 750 g.p.m. capacity. *Cuno Engineering Corp.*

IT'S NEW ✓ CHECK IT

(23) OIL EQUIPMENT. A large, multicolored catalog, which will appeal particularly to the marketing division of the petroleum industry, covers tanks, trailers, and handling equipment. Prices and specifications are included. *Columbian Steel Tank Co.*

IT'S NEW ✓ CHECK IT

(24) MILLING MACHINES. New catalog shows pictures, as well as giving technical information, dimensions and design specifications of these machines, with accessories and attachments which make them fully adaptable to a wide range of operators. *Kearney & Trecker Corp.*

IT'S NEW ✓ CHECK IT

(25) BOILER FEED-WATER CONTROL. New pamphlet gives schematic illustrations, charts and line drawings of automatic boiler feed water controls. Principles and reasons for automatic control of feed water are given in nontechnical language. *Northern Equipment Co.*

IT'S NEW ✓ CHECK IT

(26) OIL FOR STEAM TURBINE LUBRICATION. Booklet gives history of development of these specialized oils and pictorially develops complete manufacturing techniques. Extremely well printed and illustrated. *Gulf Oil Corp.*

IT'S NEW ✓ CHECK IT

(27) MUD HOGS. New catalog describes applications and uses of diaphragm and plunger pumps used for handling thick compounds and solids in suspension. Originally developed for heavy-duty construction work and now adapted for use in petroleum industry. *Marlow Pumps.*

IT'S NEW ✓ CHECK IT

(28) CONSTANT DIFFERENTIAL WIDE RANGE OIL-BURNING SYSTEM is described in a new bulletin which explains how the system achieves efficient combustion over a range in capacity as great as 50 to 1, controlling any number of burners throughout all variations in capacity. *Peabody Engineering Corp.*

IT'S NEW ✓ CHECK IT

(29) "GUIDE TO EVERYDAY WELDING" is offered as a guide in the selection of the proper type of electrode or gas welding wire to be used for welding various types of materials, structure, and equipment. Arranged in easy-to-find tabular form, indexed by industries. *Page Steel & Wire Div., American Chain & Cable Co.*

IT'S NEW ✓ CHECK IT

(30) SAFETY LINER HANGERS. Two new bulletins cover this manufacturer's liner hangers as well as accessories incidental to their use. Packers and setting tools are included. *Burns Tool Co.*

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Natural Gas

Plans for Seven Plants Outlined at Conference

CORPUS CHRISTI.—Attention was again focused on waste of natural gas when the Texas Railroad Commission met with operators of this area in the first of its four statewide conservation conferences.

The commission was told that seven plants will soon be constructed to process flare gas for reinjection into reservoirs or producing sands or for sale to pipe lines, in addition to equipment now operating in 11 other fields. Present equipment and that definitely planned will provide only about one-third of the 52 fields in this area with processing equipment. The commission's next meeting will open February 20 in Houston.

The seven new projects are: Barnsdall Refining Co., a plant in the Placedo field in which independent operators will cooperate, designed to handle most of the 8,000,000 cu. ft. of casinghead gas now being flared; Magnolia Petroleum Co., a plant in the West Ranch field where 19,000,000 cu. ft. daily is now being flared; Humble Oil & Refining Co., two plants, one in the Maurboro field to utilize at least 81 per cent of the 1,000,000 cu. ft. flared daily, the second to compress and return to the sands gas in the Kelsey field where 4,500,000 cu. ft. daily is now being flared; Plymouth Oil Co., a cycling plant in the Rooke field available to all operators; Hiawatha Oil Co., a small gasoline plant in addition to its present repressuring plant in the Benavides field; and Government Wells Oil Co., a repressuring plant in the Lundell field.

FPC Charleston Hearing Scheduled for April 2

WASHINGTON.—The regional hearing of the Federal Power Commission in its investigation of the natural gas industry will be held April 2 instead of April 12 as previously reported. The hearing was originally set for March 19. The Chicago hearing in the investigation is set for February 19.

First Gas Flow in June, New Contract Provides

AMARILLO. — First deliveries of natural gas are scheduled for June 1 under terms of a contract between Panhandle Eastern Pipe Line Co. and Shamrock Oil & Gas Corp.

Panhandle Eastern, which distributes to north central states, strengthened its reserves with Shamrock setting aside to Panhandle Eastern's future needs a block of 57,000 acres of gas land in Sherman and Moore counties where Shamrock has extensive holdings.

Shamrock will gather and process gas, compressing it if necessary, and deliver the product to a line to be laid by Panhandle Eastern to a point near Shamrock's McKee plant northeast of Dumas in Moore County. The contract calls for an initial minimum of 30,000,000 cu. ft. daily, increasing to double that amount in 10 years.

Royalty will be greater for the land owner since the sale price in the contract is higher even after deductions of processing cost than was the amount paid for the gas which was being used for carbon black companies, Shamrock officials said.

Plans for the 1946 Southwestern Gas Measurement Short Course were formulated by the general committee at a meeting in Oklahoma City. Committee members shown above are, left to right: Front row: E. C. McAninch, Oklahoma Natural Gas Co.; Earl Kightlinger, Arkansas Louisiana Gas Co.; James L. Griffin, Northern Natural Gas Co.; Miss Kate A. Niblack, Oklahoma Utilities Association; R. M. Scofield, Lone Star Gas Co., program committee chairman; C. A. Gibson, Cities Service Gas Co., general chairman; Dean W. H. Carson, University of Oklahoma; C. E. Terrell, Southern Natural Gas Co., and W. H. Woods, Gulf Oil Corp. Back row: J. H. Satterwhite, American Meter Co.; W. R. McLaughlin, Pittsburgh Equitable Meter Division; William F. Lowe, Natural Gasoline Association of America; W. A. Brewster, Arkansas Louisiana Gas Co.; T. S. Whitis, West Texas Gas Co.; Pat H. Miller, Panhandle Eastern Pipe Line Co.; E. L. Stark, Foxboro Co.; George E. Greiner, Phillips Petroleum Co., and Ben F. Worley, United Gas Corp.

Natural Gasoline

Gas Utilization Program Will Cost $58,000,000

HOUSTON. — Natural gas processing plants will be built in 10 Gulf Coast fields by Humble Oil & Refining Co. and associating companies in a 2-year, $58,000,000 gas-utilization program.

The extent of the projects came to light at the Federal Power Commission hearing here at which Texas officials and industrial leaders defended state control of natural gas. Stuart E. Buckley, Humble production department head, said his company will bear $36,000,000 of the expense of the program with the remainder furnished by participating companies in the various fields. A total of 145,000,000 cu. ft. of gas daily will be utilized with completion of the plants.

Fields where plants will be constructed, according to Buckley, are: Flour Bluff field, Nueces County, plant to process 7,000,000 cu. ft. daily, residue to transmission lines; Anahuac field, Chambers County, to process 32,000,000 cu. ft. daily, residue to transmission lines; East Clear Lake, Friendwood, and Dickenson fields, Harris and Galveston counties, to process 35,000,000 cu. ft. daily, residue to pipe lines; North Katy field, Waller County, to process 8,000,000 cu. ft. from oil producing section of the field; Tom O'Connor field, Refugio County, to process 20,000,000 cu. ft. daily, residue to pipe lines; Lovell Lake, Jefferson County, to process 7,000,000 cu. ft. daily, residue to pipe lines; Kelsey field, Starr County, to process 6,000,000 cu. ft. daily, residue to reservoir; Heyser field, Calhoun County, to process 30,000,000 cu. ft. daily, gas to be sold to pipe-line company.

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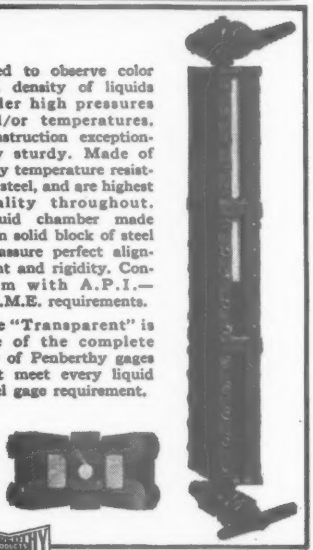

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REFINING

Malco's Artesia Refinery Bought by Continental

PONCA CITY.—Continental Oil Co. officials this week made plans to consolidate the company's Artesia, N. M. refinery with an adjacent plant which Continental has purchased from Malco Refineries, Inc.

Acquisition of the Malco refinery was disclosed by Dr. Walter Miller, vice president in charge of manufacturing, in an announcement which did not reveal the purchase price and stated completion of the deal is subject to final acceptance of title to the property. The two refineries will now be operated as one plant with a total daily charging capacity of 2,500 bbl. of crude from New Mexico fields.

"Purchase of the Malco plant was made necessary because of Continental Oil Co.'s growing market in New Mexico," said Dr. Miller. "Only recently the New Mexico marketing division was expanded to be one of the company's largest, with the transfer of 45 Texas and 4 Oklahoma towns to the territory supervised by our Albuquerque offices."

Valvoline Laboratory Moved to East Butler

FRANKLIN, Pa.—Removal of the Freedom-Valvoline Oil Co.'s research laboratory from Franklin to the company's plant in east Butler is under way. At Butler, the laboratory will be devoted to research in new petroleum products. During the war, laboratory workers at Franklin developed rust preventive materials used by the Navy.

Pemex Will Complete New Refinery Units in July

MEXICO CITY. — Latest information here is that the new units of Petroleos Mexicanos' expanded Atzcapotzalco refinery, in the outskirts of Mexico City, will be finished by next July. Construction of the heavy units will be finished by May 1 but various detailed installations in the small units will require longer.

Tests are to be run in June, according to present construction plans, and the completed job is to be turned over to Petroleos Mexicanos by July.

Arthur G. McKee and Co., Cleveland, is the construction company handling the job. Phillips Petroleum Co., Bartlesville, Okla., is serving under contract as technical adviser to Petroleos Mexicanos during construction and will carry on in such capacity until Mexican engineers take over operation.

Delay in completing the expansion project has been caused by difficulty in obtaining certain equipment. With the let-up in priorities at the end of the war, American supply concerns, which have been furnishing the equipment, found themselves swamped with domestic demands and Petroleos Mexicanos has had to await its turn.

The expanded refinery will have a capacity for processing 38,000 bbl. of crude daily; 37,000 bbl. for 58-62 octane motor gasoline and 1,000 bbl. for 100-octane aviation fuel.

Iraq Official Negotiating For Additional Refinery

NEW YORK. — Preliminary negotiations for another refinery in Iraq are now being conducted by Dr. Sayid El Pachachi, director general of the Iraq Ministry of Economics and a delegate to the United Nations Organization, according to reports here.

Whether this refinery will be a topping plant, like the other two, or a cracking unit could not be determined. The topping plants already constructed are located at Alwand and in the Kirkuk field.

Shell to Give War Plant Role in Postwar System

HOUSTON. — A catalytic cracking plant, originally designed as a war-expansion project to meet aviation gasoline demands, is taking shape near here as an addition to the peacetime facilities of Shell Oil Co., Inc.

Like many other wartime projects, the location east of the company's original Houston refinery site required complete preliminary work, such as drainage, sewers, roads, power lines, water supply and railroad lines, before actual construction could commence.

The fluid catalytic cracker will process 25,000 bbl. of crude daily into high-octane motor gasoline, burning oil distillates and light fractions such as alkylate, butadiene or chemicals. Included are several auxiliary installations, among them gas

recovery plant, feed preparation plant and products treating plants.

Cold-Starting Plane Fuel Announced by The Texas Co.

NEW YORK.—A cold-starting fuel which will enable aviation engines to be started in 2 minutes in subzero weather has been announced by The Texas Co. The fuel is liquid at all atmospheric temperatures and can be shipped and handled in containers built for ordinary atmospheric pressures.

The method employed is to attach an auxiliary portable tank, containing the special fuel, to the carburetor of the engine, cutting off temporarily the regulator fuel supply. The engine is started on the special fuel and operated until warm enough to continue on the regular fuel.

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"GUNITE" CONCRETE SINCE 1915

November Gasoline Yield Placed at 42.7 Per Cent

WASHINGTON. — American refineries last November were converting 42.7 per cent of their daily crude runs into gasoline, latest available figures of the Bureau of Mines show.

Percentage gasoline yields presumably have dropped in recent weeks in view of the continuing oversupply of this product and a critical shortage of heating oils. The bureau's report for last November shows the 42.7 yield in that month was an increase both over October and November, 1944, when gasoline yields were 40.3 and 40.7 per cent respectively.

Of the total yield, 24.9 was cracked gasoline, and 17.8 per cent, the straight-run product. Yields of other major products for November were kerosene 5.5 per cent, distillate 14.4, residual 27.4, and lubricating oil 2.5.

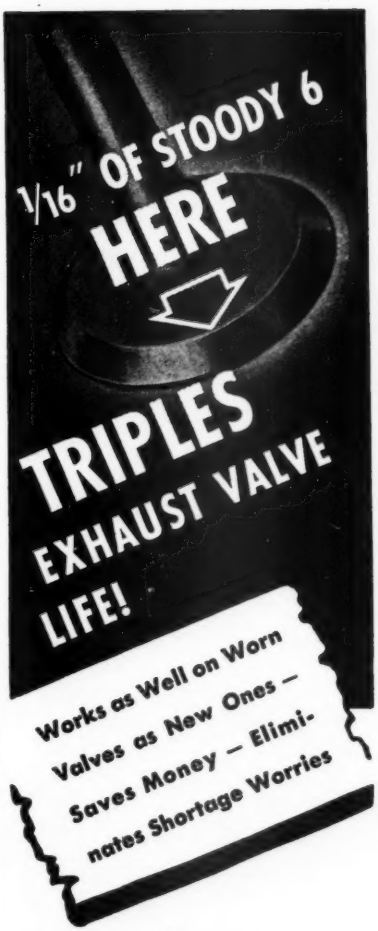
Report Shows War, Peace Aviation Gasoline Demand

WASHINGTON. — The impact of war's end on aviation gasoline consumption is highlighted by Bureau of Mines statistics showing demand dropped in November to 1,579,000 bbl. from 17,252,000 bbl. a year earlier.

Principal decline in demand came in the 100-octane grade with demand in November at 676,000 bbl. compared with 13,848,000 bbl. a year earlier.

Production of 100 octane and above totaled 12,798,000 bbl. in November 1944. A year later, it had dropped to 278,000 bbl. Output of other grades held up better with a drop from 3,861,000 bbl. to 2,366,000 bbl. noted for the year's period. November's production of other grades, in fact, showed an increase from the total of 1,831,000 bbl. in October 1945.

Another sharp decrease was shown for exports. Total for November was 108,000 bbl. as against 4,150,000 bbl. in November 1944. Aviation gasoline stocks also dropped. In November 1944, stocks of 100 octane and above stood at 4,025,000 bbl. and other grades at 9,238,000 bbl. In October 1945, these were 2,029,000 and 3,385,000 bbl., respectively. In November, the totals were 1,626,000 and 3,517,000 bbl., respectively.


1/16" OF STOODY 6
HERE
TRIPLES
EXHAUST VALVE
LIFE!
Works as Well on Worn Valves as New Ones — Saves Money — Eliminates Shortage Worries

AN ounce or two of Stoody 6 welded to new or worn exhaust valve faces adds 300 to 400 percent to their normal life, prevents burning, saves overhaul jobs, costs only a few cents per valve.

This folder outlines the simple procedure any garage or shop equipped with acetylene welding equipment can follow. Eliminates your worries about valve replacements and saves money as well.

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1138 SLAUSON AVE., WHITTIER, CALIF.

STOODY 6 · THE METAL THAT ADDS EXTRA MILES TO EXHAUST VALVE LIFE!

"Just give the job to PIPE LINE SERVICE CORPORATION and your worries will be over!"

A COMPLETE PIPE PROTECTION SERVICE YOU CAN DEPEND ON

PIPE CLEANING—An extra PLS service at no extra cost. Assures proper bond between bare pipe and coating.

COATING and WRAPPING—Any type of coating and wrapping mechanically applied at all six PLS plants, at yard or railhead and over the ditch.

PIPE SHIPMENT—Protected pipe carefully packed for rail shipment to distant points. Also truck deliveries, where practical.

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PIPE LINE SERVICE CORPORATION

PIONEERS IN STEEL PIPE PROTECTION

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Corpus Christi, Texas • Harvey, Louisiana

PIPE LINES

Magnolia Trunk Capacity Raised to 66,000 Bbl.

DALLAS.—An increase in capacity by 9,000 bbl. per day has been made possible in Magnolia Pipe Line Co.'s Midland-Corsicana trunk carrier by the installation of new pumping units.

The 12-in. 335-mile line now has a capacity of 66,000 bbl. per day. The new units were placed in the Clyde and Walnut Springs pumping stations. Sour crude from the Permian Basin area is moved through the line which parallels Magnolia's 8-in. sweet-crude carrier and uses the same pumping stations.

Texas-Los Angeles Carrier Approved by California

SAN FRANCISCO.—The state Railroad Commission has approved California's section of the proposed $40,000,000 natural gas pipe line from Texas—a project which California hopes will conserve its own declining gas supply.

Next step in preliminaries toward the pipe line, California's first interstate natural gas carrier, is the Federal Power Commission hearing which was due to open this week in Washington. Later testimony will be taken in Los Angeles.

The three companies involved are El Paso Natural Gas Co. which is planning a 1,000-mile trunk from Permian Basin and Hugoton fields to the California-Arizona border at Blythe at an estimated initial cost of $27,822,000, and the Southern California Gas Co. and Southern Counties Gas Co., which in a joint application propose to continue the line from Blythe 214 miles westward to tie into the Los Angeles system at an estimated initial cost of $12,140,000.

Terming the carrier "both economically and physically feasible," the California Railroad Commission commented that "this state's declining gas supply must be conserved, and the supply available to utilities serving the Southern California territory must be augmented not only to meet the growth in the load but also to maintain present customer service."

B. M. Laulhere has been named to take charge of engineering and construction of the California link when final approval is granted. Laulhere, designated for the project by H. L. Masser, executive vice president of Southern California Gas Co., was in charge of the conversion of the company's gas generating plant to the production of butadiene during the war.

Coal, Labor Groups Lose Fight Against Pipe Line

WASHINGTON.—Attempts by coal and labor organizations to halt proposed construction of a natural gas pipe line to Nashville have been rebuffed by the Federal Power Commission.

FPC denied a petition for reconsideration and a stay of its order. Interveners were the National Coal Association, United Mine Workers, and four railway labor unions. The December 29 FPC order authorized Tennessee Natural Gas Lines, Inc., to construct a 14-mile line from a connection with Tennessee Gas & Transmission Co. to a city gate connection with Nashville Gas & Heating Co.

Ajax Pipe Line Records New High in Throughput

A throughput record was established by Ajax Pipe Line Corp. in 1945 with net deliveries of crude oil for the year of 30,936,163 bbl. The daily average of 84,756 bbl. compares with 84,239 bbl. in 1944 and 82,307 in 1943.

Motor Fuel Movement Drops Sharply From War Months

WASHINGTON. — Reflecting the heavy cutbacks in oil operations with the end of the war, Bureau of Mines figures show the volume of motor

PIPE LINES

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CONSULTING ENGINEER

HARRISON 6115

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WHEN YOU WANT The Best IN PIPELINE CONSTRUCTION

OKLAHOMA CONTRACTING COMPANY

DALLAS TEXAS

SOUTH AMERICA
APARTADO 1085
CARACAS, VENEZUELA

BUCKEYE MODEL 12 digs more trench in less time, at lower cost. Digs trench 15" to 24" wide — up to 5½' deep.

BUCKEYE TRACTION DITCHER COMPANY
Findlay, Ohio
Built by Buckeye
TRENCHERS. SHOVELS. CRANES
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C. S. FOREMAN COMPANY

General Contractors

PIPE LINES

20 West Ninth Street
Kansas City, Missouri

fuel turned into pipe lines in November dropped 9,850,000 bbl. from the total in the corresponding month of 1944.

November's total of 16,767,000 bbl. of motor fuel compared with 26,617,000 bbl. in November, 1944. Gain over October, 1945, was slight in comparison to the decrease from November 1944. October's total was 15,411,000 bbl.

For the first 11 months of 1945. motor fuel turned into pipe lines amounted to 265,812,000 bbl., compared to 257,189,000 bbl. for the corresponding period of 1944. Stocks in lines and working tanks at the end of November amounted to 9,835,000 bbl., compared to 11,517,000 bbl. in November, 1944, and 9,021,000 in October.

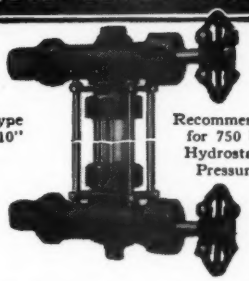
Figures on motor-fuel deliveries from pipe lines followed the same general pattern. November's total was 15,857,000 bbl. October, 17,877,000 bbl.; November, 1944, 26,816,000 bbl.; first 11 months of 1945, 267,218,000 bbl.; and first 11 months of 1944, 253,088,000 bbl.

Rangely Crude Moving to Middle West Refineries

Crude oil from the Rangely field is now moving to both eastern and western markets as a result of the reversal of the flow in the Utah Oil Refining Co. pipe line eastward from Wamsutter to Fort Laramie, Wyo., where it connects with the Stanolind line to Freeman, Mo. The oil continues to move westward to Salt Lake City from Wamsutter through the Utah Oil Refining line. The line from Rangely to Wamsutter was completed late last year, and up to January 20 pressure was supplied by portable pumps. The permanent pumping station now is completed and is in operation and brings the capacity of the line up to 20,000 bbl. per day. Another line from the Wilson Creek and Iles fields also connects with the trunk line at Wamsutter, from which point it can move in either direction. Lance Creek crude which formerly moved from Fort Laramie to Salt Lake City and other points no longer goes to the last-named destination. The setup, however, continues to take care of Colorado and Wyoming commitments.

Standard Oil Co. (Indiana) through its crude oil purchasing department, buys the Rangely crude and transports it through the above-mentioned system to its several destinations. The company recently opened an office for the district in the First National Bank building in Denver and is actively engaged in building up the market for the western Colorado crudes. It hopes to bring its purchases in the Rangely field up to an average of 16,000 bbl. daily for February.

PENBERTHY
DROP FORGED STEEL
LIQUID LEVEL GAGES



Type "10"

Recommended for 750 lb. Hydrostatic Pressure

Steel construction throughout with stainless steel interior trim. Automatic shut-off is positive and instantaneous; stainless steel balls shut off the flow of liquid when glass breaks. Heavy duty stuffing boxes, union connections, offset construction facilitate cleaning and simplify glass replacement. Conform with A.P.I.—A.S.M.E. requirements.

This is one of the complete line of Penberthy gages that meet every liquid level gage requirement.

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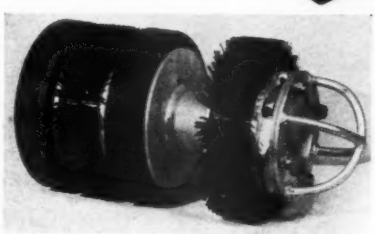
DETROIT, MICH.
Canadian Plant WINDSOR, ONTARIO

WRITE FOR LATEST INFORMATION

Jet-Rotation Pigs
CLEAN PIPELINES BETTER



Type RC Pipe Line Pig

- A proven scraper tool
- With Jet-Rotation feature*
- Revolves as it cleans
- Distributes wear of wire brushes and rubber cups

For crude oil, products, natural gas and water lines. Sizes 6-inch to 16-inch. Other types in sizes 2-inch to 26-inch.

*Patent pending.

THE PIG WITH THE POKE CLEANS PIPE LINES

T.D. WILLIAMSON, Inc.
TULSA, OKLAHOMA

STATISTICS and

WEEKLY WELL COMPLETIONS . . . WEEK ENDED FEBRUARY 9, 1946

	Total of all wells					Cum. to date		Wildcat completions and discoveries					Cumulative total, 1946				
	Comp.	Oil	Gas	Dry	Footage	1946	1945	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	27	14	0	*13	44,313	170	143	0	0	0	0	0	0	0	0	0	0
Pennsylvania	68	34	3	†31	110,283	529	362	0	0	0	0	0	0	0	0	0	0
West Virginia	12	0	9	3	34,645	65	53	0	0	0	0	0	0	0	0	0	0
Ohio	26	4	14	8	67,580	116	74	1	0	1	0	2	1	0	4	5	10
Indiana	8	7	0	1	15,419	35	21	0	0	0	1	1	0	0	0	5	5
Kentucky	11	2	6	3	27,228	53	43	0	0	0	0	0	1	0	0	7	8
Illinois	34	23	0	11	80,736	216	216	1	0	0	6	7	4	0	0	43	47
Michigan	7	3	0	4	14,945	71	83	1	0	0	3	4	1	0	0	24	25
Kansas	39	21	8	10	125,788	256	166	1	0	0	4	5	2	0	1	34	37
Neb., Mo., Iowa	0	0	0	0	0	1	6	0	0	0	0	0	0	0	0	1	1
Oklahoma	39	18	7	14	160,651	264	271	0	0	0	7	7	7	0	2	44	53
Texas	158	95	12	‡51	615,516	889	744	4	0	0	27	31	13	0	4	134	151
North Central	52	29	0	23	168,012	311	211	1	0	0	15	16	4	0	0	47	51
West	31	24	0	7	135,896	187	185	2	0	0	5	7	5	0	0	19	24
Panhandle	12	4	8	0	36,335	45	67	0	0	0	0	0	0	0	0	2	2
Eastern	13	3	3	‡7	83,933	81	29	0	0	0	2	2	1	0	0	16	17
Gulf Coast	41	29	0	12	170,977	216	186	1	0	0	4	5	2	0	2	36	40
Southwest	9	6	1	2	20,363	49	66	0	0	0	1	1	1	0	2	14	17
Louisiana	18	12	0	6	115,690	127	109	0	0	0	3	3	8	1	0	13	22
Northern	10	5	0	5	46,943	66	33	0	0	0	3	3	2	0	0	10	12
Southern	8	7	0	1	68,747	61	76	0	0	0	0	0	6	1	0	3	10
Arkansas	5	5	0	0	16,773	17	18	0	0	0	0	0	0	0	0	1	1
Mississippi	4	3	0	1	28,448	28	33	0	0	0	1	1	0	0	0	7	7
Southeastern States	1	0	0	1	4,133	8	2	0	0	0	1	1	0	0	0	7	7
Montana	4	1	1	2	4,915	30	32	0	0	0	0	0	0	0	0	1	1
Wyoming	2	1	0	1	3,751	19	27	0	0	0	1	1	1	0	2	8	11
Colorado	1	1	0	0	6,290	12	4	0	0	0	0	0	0	0	0	2	2
New Mexico	9	8	0	1	51,201	51	61	0	0	0	1	1	1	0	0	5	6
California	34	29	0	5	154,548	211	254	2	0	0	2	4	2	0	1	25	28
Total United States	507	281	60	166	1,628,853	3,168	2,752	10	0	1	57	68	41	1	14	366	422
Total previous week	468	267	37	164	1,731,728	2,561	2,305	2	0	4	50	56	31	1	13	309	354
Total Feb. 10, 1945	447	245	45	157	1,662,803	2,752	2,042	7	0	4	59	70	60	0	17	380	457

Service wells included: *13, †31, ‡1.

MARKET QUOTATIONS

(This service is abbreviated because most refinery products are selling at the Government's price ceilings. Quotations on other products than those shown here furnished on request. Quotations are f.o.b. plant in tank cars and in cents per gal. as of last Monday.)

REFINERY GASOLINE

Octane (A.S.T.M.)	78-80†	73-75
Mid-Continent*	6.125-6.375	5.375-5.75
Gulf Coast	6.75	5.75-6.50
New York Area		7.425-7.90
California		6.50-7.00

*Basic Oklahoma Group 3. †1939 C.F.R. (research method).

NATURAL GASOLINE

Grades:	26-70	18-55
Oklahoma (Group 3)	3.25-3.50	3.9-4.2
N. Texas (f.o.b. plant)	3.000	3.600
N. Louisiana (f.o.b. plant)	3.375	4.050
California	4.875	5.500

CRUDE-OIL PRICES

Representative posted schedules per bbl

East Texas	$1.25
Conroe	1.43
Tepetate, Louisiana, avg. grav.	1.20
Illinois Basin	1.37
Pecos County, Texas	.95
Bradford, Pennsylvania	3.00
Van, Van Zandt County, Texas	1.08

Note: Exclusive of subsidy.

GRAVITY SCHEDULES

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Texas	West Tex.*
18-18.9	$0.80	....	....	....
19-19.9	.84	....	$1.06	$0.70
20-20.9	.88	$0.85	1.08	.72
21-21.9	.92	.87	1.10	.74
22-22.9	.96	.89	1.12	.76
23-23.9	1.00	.91	1.14	.78
24-24.9	1.03	.93	1.16	.80
25-25.9	1.07	.95	1.18	.82
26-26.9	1.11	.97	1.20	.84
27-27.9	1.15	.99	1.22	.86
28-28.9	1.18	1.01	1.24	.88
29-29.9	1.20	1.03	1.26	.90
30-30.9	1.23	1.05	1.28	.92
31-31.9	....	1.07	1.30	.94
32-32.9	....	1.09	1.32	.96
33-33.9	....	1.11	1.34	.98
34-34.9	....	1.13	1.36	1.00
35-35.9	....	1.15	1.38	1.02
36-36.9	....	1.17	1.40	1.04
37-37.9	....	1.19	1.42	1.06
38-38.9	....	1.21	1.44	1.08
39-39.9	....	1.23	1.46	1.10
40 and above	....	1.25	1.48	1.12

*Includes Lea County, New Mexico.

A.P.I. REFINERY REPORT

Week ended February 2, 1946
(Figures in thousands of barrels)

	Dly. crude runs to stills	Stocks: Gasoline	Distillate	Residual
East Coast	728	22,175	8,409	5,822
Appalachian	152	4,120	578	505
Ill., Ind., Ky.	696	21,886	3,948	2,681
Okla., Kan., Mo.	385	9,682	1,386	1,025
Inland Texas	215	3,058	289	655
Tex. Gulf Cst.	1,087	16,646	5,452	4,285
La. Gulf Coast	307	5,322	1,436	1,203
N. La., Ark.	61	2,036	435	233
Rocky Mtn.	125	2,141	374	747
California	774	15,769	6,632	21,930
Total 2- 2-46	4,530	102,835	28,939	39,086
Total 1-26-46	4,553	101,737	29,498	39,722
Total 2- 3-45	4,695	92,141	31,301	50,203

CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended:	Bbl. of crude*
February 2, 1946	224,351,000
January 26, 1946	220,544,000
February 3, 1945	221,674,000

*Excludes unrefinable Calif. stocks.

TRENDS

DAILY AVERAGE PRODUCTION FOR WEEK

	Feb. 9 crude oil	Bureau of Mines demand forecast	Feb. 2 crude oil
Alabama	950	500	650
Arkansas	77,300	74,000	77,050
California	846,350	844,000	840,350
Colorado	22,630	24,000	23,090
Eastern	63,500	61,200	59,950
Florida	100	100	100
Illinois	212,600	198,000	207,800
Indiana	16,500	13,000	15,100
Kansas	236,700	254,000	239,600
Kentucky	32,000	29,000	29,500
Louisiana	368,300	368,000	368,650
North Louisiana	79,650	.....	79,800
South Louisiana	288,650	.....	288,850
Michigan	44,280	46,000	44,370
Mississippi	55,200	49,000	56,750
Montana	21,640	20,400	21,670
Nebraska	750	800	750
New Mexico	98,000	96,000	100,350
Oklahoma	389,100	368,000	387,400
Texas	2,109,250	1,890,000	2,000,800
East Texas	321,000	.....	320,000
East Central Texas	146,200	.....	140,050
North Central Texas	157,600	.....	152,800
Texas Panhandle	81,000	.....	81,000
West Texas	503,300	.....	489,300
Southwest Texas	356,150	.....	328,900
Texas Gulf Coast	544,000	.....	488,750
Wyoming	87,850	94,000	89,410
Total United States	4,683,000	4,430,000	4,563,340
Change from prev. week, up	119,660		

Total production Jan. 1-Jan. 9, 1946 (Revised).... 192,654,280 bbl.
Same period last year ..... 188,682,650 bbl.

CRUDE-OIL STOCKS 224,351,000 bbl. as of Feb. 2—up 3,807,000 bbl. One year ago 221,674,000 bbl.

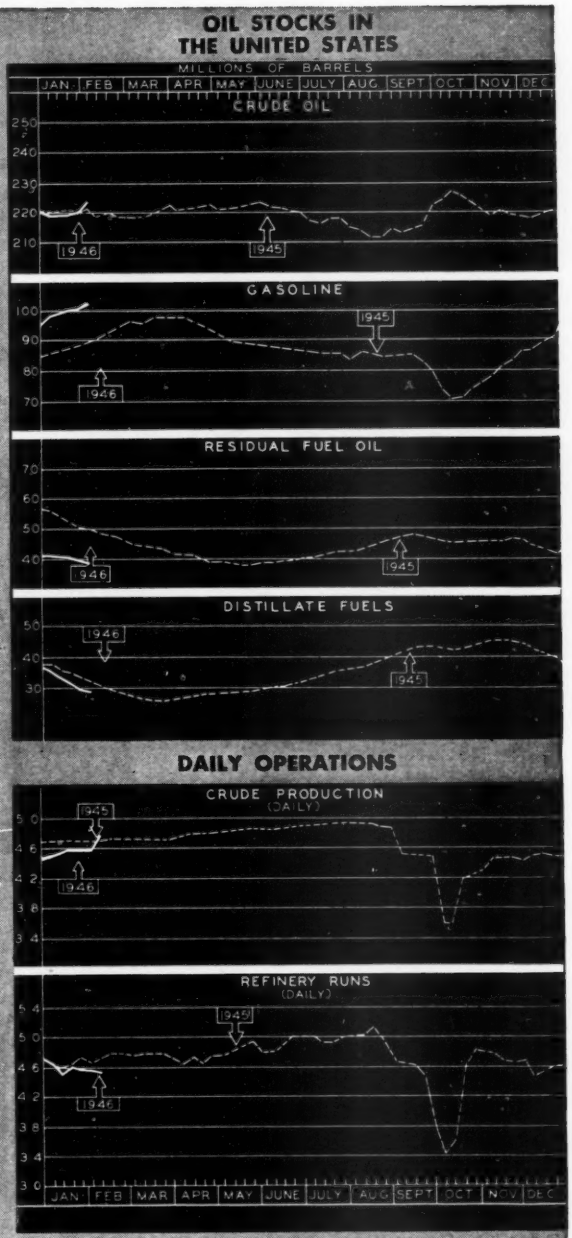
GASOLINE STOCKS 102,835,000 bbl. as of Feb. 2—up 1,098,000 bbl. One year ago 92,141,000 bbl.

RESIDUAL FUEL-OIL STOCKS 39,086,000 bbl. as of Feb. 2—down 636,000 bbl. One year ago 50,203,000 bbl.

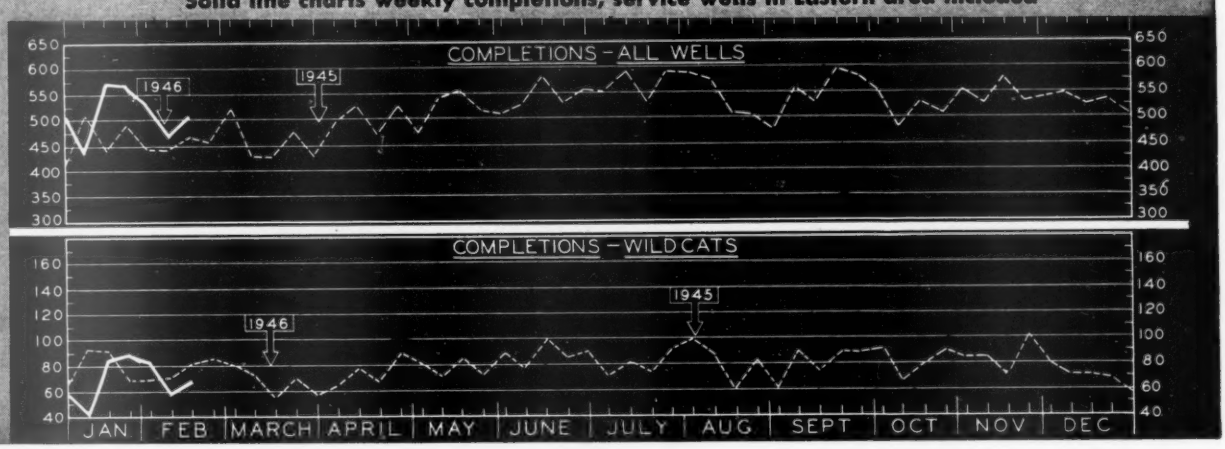
GAS OIL AND DISTILLATE STOCKS 28,939,000 bbl. as of Feb. 2—down 559,000 bbl. One year ago 31,301,000 bbl.

CRUDE-OIL PRODUCTION 4,683,000 bbl. as of Feb. 9—up 119,660 bbl. One year ago 4,722,200 bbl.

REFINERY RUNS 4,530,000 bbl. daily week ended Feb. 2—down 23,000 bbl. One year ago 4,695,000 bbl.



Solid line charts weekly completions, service wells in Eastern area included



LOOK FOR THE MARK OF QUALITY

W.C. NORRIS

SWAGED NIPPLES & BULL PLUGS

3 Times Stronger IN THE NOSE

The NORRIS method of forging furnishes 3 TIMES the wall thickness in the nose—extra strength, where it's needed most.

NORRIS
Forged Steel Seamless Welding Reducers

EXPERIENCE
Building Oil Tools
SINCE 1882

FOR over half a century the name W. C. NORRIS and QUALITY have been synonymous in oil tools. Through quality and dependability on the job, NORRIS Swaged Nipples and Bull Plugs have won for themselves the highest endorsement of Petroleum Engineers, Superintendents and Production men of long experience.

Made of the finest materials, forged to exact size before threading, NORRIS Swaged Nipples & Bull Plugs during process of manufacture must undergo five inspections, insuring perfect fittings. Threaded to precision standards. The exterior is a special finish known as NORRISIZING, making them impervious to corrosion at no extra cost over ordinary painted finishes.

Each Swaged Nipple and Bull Plug carries a NORRIS Quality Label, showing its weight, size pipe and thread. Made from Standard, Extra Heavy and Double Extra Heavy Seamless Pipe. Be sure they're NORRIS — then you can forget them. See your supply store.

W.C. NORRIS MANUFACTURER, INC.

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FOR VICTORY

Exploration and Drilling

TXL Extension Cuts Fault

WEST TEXAS geologists have a saying among themselves that every Ellenburger well is practically a semiwildcat, because of the steeply folded formations in the pre-Permian, frequently complicated by truncation erosion.

As the TXL field in Ector County is in process of getting about a ¾-mile southeast Ellenburger extension in The Texas Co. 1-D, SW SW Section 27, Block 45, Township 1 South, the reason back of this statement becomes apparent.

The well is finding the Ellenburger about 1,200 ft. low structurally, compared to wells further west, and it appears that there is a very large fault on the east side of the TXL structure, with the downthrow side to the east. On the other hand, it appears likely that part of the downthrow side of the structure will produce in the Ellenburger.

This test, if completed successfully, will add productive acreage on the east side of the field, but how much is a problem, the answer to which may cost some expensive dry holes. As the subsurface picture stands now, the wells on the west side of the field find some Mississippian present below the Permian; and this disappears eastward up structure, with the Devonian presenting an eroded surface when the Mississippian cover is removed.

Where Mississippian is present, the Ellenburger is too low to produce, but the Devonian may yield oil, and at places the Silurian will also produce. Farther eastward on top of the structure, the Ellenburger production comes in. Now it appears that this eastward structural rise is to be cut off abruptly by a sharp fault, but that even a downthrow of over 1,000 ft. will not necessarily cause the Ellenburger to be dry.

Some of the questions now to be answered are these. How steeply will the faulted east portion of the structure dip? If it dips eastward at about the same rate as the eastward rise of the western portion of the structure, how about the water levels? Does this mean that there will be a repetition on the east side of the history of the west side in that as the Ellenburger goes down structure the shallower Devonian and Silurian pays will also contain oil?

These and other questions in the West Texas pre-Permian development have many geologists in that area searching the literature on Rocky Mountain geology. Rocky Mountain fields appear to afford the nearest parallels to the conditions now being found in the pre-Permian.

SOUTHWEST TEXAS

New Gas-Condensate Pay Opened at Los Indios

CORPUS CHRISTI.—A new gas-condensate pay discovery at Los Indios field in Hidalgo County, Baldridge & King 2 W. L. Goldston, gaged 2,900,000 cu. ft. of gas per day with an estimated 75 bbl. of condensate, on a ¼-in. choke, no water. It had shown for an estimated 13,300,000 cu. ft. of gas per day on open flow. Total depth is 8,449 ft., and production is through perforations at 6,030-58 ft. Tubing pressure 2,200 lb., and shut-in pressure 2,465 lb.

A new oil sand for the La Reforma field of Starr County, has been discovered by Baldridge & King 1 A. Guerra estate. Drilled to total depth of 6,986 ft., this test flowed several bbl of oil per hour on initial test through perforations at 6,145-58 ft. Well is now shut in for storage. The 5½-in. casing was set at 6,986 ft.

Six miles south of Myersville in DeWitt County, Amerada Petroleum Co. 1 F. C. Dreier et al, wildcat, was dry. This test was drilled to a total depth of 9,123 ft. An electrical log was run, and sidewall samples taken, but no commercial showings were recorded.

In the Petronilla area of Nueces County, near North Luby field, Stanolind Oil & Gas Co. 3-A J. T. Gillette will be drilled as an 8,350-ft. wildcat test. This test is located in Roberts & White subdivision of the Canutillo Colony Ditch Co. Survey.

A 10,000-ft. deep test is scheduled to be drilled by Sun Oil Co. in the Yturria area of Starr County. This test, 3 B. G. de Garcia, is in Porcion 98, and is 3,002 ft. southwest of the 2 Garcia, dry hole.

In Karnes County, Seaboard Oil Co. 6 E. N. Hysaw, in the Hysaw field, flowed a potential gage of 120 bbl. per day on 3/16-in. choke through perforations 3,959-61 ft., no water, 26° gravity oil, with gas-oil ratio 7,900 to 1, tubing pressure 1,160 lb.

There were 25 new locations reported this week with 10 being wildcats, 2 in Caldwell, 2 in Milan, and 1 each in Live Oak, Nueces, Starr, Victoria, Williamson, and Zapata counties. Of the 31 completions only 4 were wildcats, 1 new pay in Hidalgo County, and 3 dry holes, 1 each in Bexar, Calhoun, and Jim Wells counties. Aviators field in Webb County led in activity with five producers reported.

SOUTHWEST TEXAS SUCCESSFUL WILDCATS

Hidalgo County: New pay in Los Indios field—Baldridge & King 2 W. L. Goldston, Santa Anita Grant, 5 mile NW of Linn, TD 8,449 ft., perf. 144 holes 6,030-58 ft., top sand 6,030 ft., PT 2,900,000 cu. ft. gas and estimated 75 bbl. condensate per day through ¼-in. choke, estimated 13,300,000 cu. ft. gas open flow, TP 2,200 lb., SIP 2,465 lb., no water.

SOUTHWEST TEXAS WILDCAT FAILURES

Bexas County: Mellie Pegg, Milton Pegg and W. H. Bode 1-A E. A. Lowe, H. Virm Sur. 195, dry at 1,002 ft.

Calhoun County: Fred Browning 1 T. P. Traylor, E. Ferguson Sur., 10 mi. N of Tivoli, dry at 6,519 ft.

Jim Wells County: Bridwell Oil Co. 1-A Ramon Garcia, La Trinidad Grant, 3½ mi. SW of Ben Bolt, dry at 5,933 ft.

SOUTH LOUISIANA

New Productive Zone Found in Egan Field

NEW ORLEANS.—A new sand for the Egan field of Acadia Parish has been opened by Sun Oil Co.-Sohio Petroleum Co. 1-A Hayes, 38-9s-1w. The well made an initial gage of 135 bbl. of 48°-gravity pipe-line oil in 18 hours through a 12/64-in. choke with 3,200 lb. pressure on the tubing. Perforations were made in the new sand section with 44 shots from 9,897-9,908 ft. for the flow.

Also in the Egan field, Acadia Parish, Irwin-Hudson et al have just completed a good well in the Camerina sand. It is 3-B Houssiere-Latreille, 30-9s-2w, which gaged 295 bbl. daily through a 10/64-in. choke with 1,500 lb. flowing pressure on the tubing, and a gas-oil ratio of 1,002 to 1. Production is through 84 perforations from 10,094-114 ft.

Pan American Production Co. 16 H. L. Garland, deep test at Port Barre in St. Landry Parish, 4-6s-5e, is making production test through a series of perforations at 9,040-48 ft., 8,982-98 ft., and 9,004-10 ft. This test is showing gas and condensate.

Humble Oil & Refining Co. 1 Louisiana Delta Farms Co., wildcat and prospective field opener in the Little Temple area of LaFourche Parish, 19-17s-23e, is still trying to get a production test. This test is reported to have about 30 ft. of good saturated sand. Total depth of the hole is 12,007 ft., and 5½-in. casing is cemented to 10,735 ft.

In the Johnson's Bayou area of Cameron Parish, Continental Oil Co. and Yegua Corp. 1 Cameron Parish School Board, 16-15s-14w, is setting 7-in. protection pipe at 8,619 ft. after drilling to a depth of 8,628 ft. A log was run to the total depth and indicated sands bearing salt water from 8,396-8,450 ft.

Humble 1-B Mrs. J. A. Bel estate, wildcat test in the Oberlin area of Allen Parish, center NW NE 33-5s-5w, continues to test. On previous tests the well showed brackish water with a slight show of oil and gas through perforations at 12,107-113 ft.

There were 15 new locations reported this week with Evangeline, Jefferson Davis, Plaquemines, and St. Martin parishes sharing the lead with 2 locations each. Only one dry hole was included in the eight completions for this week. Vermilion Parish received the greatest activity this week with two completions. The dry hole is in Terrebonne Parish.

TEXAS GULF COAST

New Field Discovered In Matagorda County

HOUSTON.—A new oil pool to be called Midfields, has been opened by Sun Oil Co. at 2 Strnadel in I&GN Survey 7, 18 miles southwest of Bay City, in Matagorda County. Total depth is 9,477 ft., with top of sand at 9,127 ft. On potential test this test flowed 229 bbl. of 42° gravity oil per day through ⅛-in. choke, gas-oil ratio 1,314 to 1, tubing pressure 200 lb., 0.1 per cent water. Production is through perforations at 9,134-36 ft.

Superior Oil Co. of California and John H. Blaffer 1 W. J. Culbertson, extension test at Sugar Valley field, Matagorda County, in Section 81 of P. Burnett and A. S. SoJourner Survey, Abstract 13, gaged 256 bbl. of high-gravity oil or condensate daily through a 12/64-in. choke with 2,540 lb. flowing pressure on tubing, along with 2,590,000 cu. ft. of gas daily. Sands showing saturation were encountered from 8,274-9 ft. and pipe was perforated from 8,274-76 ft. for completion. Total depth is 10,662 ft. and 7-in. casing cemented at 8,516 ft. This operator's 1 Sadie E. Thomasson, located 2,400 ft. northwest of the Culbertson well, is drilling ahead from 4,059 ft. in shale and lime.

Phillips Petroleum Co. deep test in the Chocolate Bayou area of Brazoria County, the 1 C. H. Green (Gratia) in the Hooper & Wade Survey 5, Abstract 429, was dry. Hole was drilled to a total depth of 11,041 ft. where drill pipe stuck at 10,239 ft. Pipe was cut and pulled at 10,201 ft. and hole cemented back to 10,133 ft. and sidetracked to a total depth of 11,002 ft. The 5½-in. casing was cemented at 9,030 ft. and a series of tests were made through four perforated intervals from 8,711 to 8,948 ft., all of which showed salt water with only slight traces of oil. Nothing of commercial interest was encountered.

Another test seeking to open Vicksburg production on the southwest flank of the Danbury dome of Brazoria County has been located by Rowan Drilling Co. at 26 Thomas Jamison, in Henry Austin Survey, Block 6, a little farther out on the flank than their 25 Jamison. The 25 Jamison test was drilled to a depth of 6,139 ft. with no shows of commercial value, then was plugged back and completed through perforations at 2,598-2,606 ft., flowing 48 bbl. of 24° gravity oil daily through a ⅛-in. choke, with 120 lb. flowing pressure on tubing and 240 lb. casing pressure.

The Altair pool of Colorado County has been extended to the southwest by Superior Oil 2-A Mrs. Myra S. Pryor. Test is flowing into tanks and preparing to gage. Total depth is 8,475 ft. with 7-in. pipe cementtd at 8,475 ft., perforated with 96 shots from 8,242-52 ft. for completion. It is flowing gas and condensate.

Also in Colorado County, Texas Gulf Producing Co. 1 Earline Landig, wildcat extension test northeast of Cities Service 1 Schobel, Columbus discovery well, in James Cummins Survey, Abstract 13, recovered 1,380 ft. of oil and 180 ft. of salt water on drill-stem test from 7,875-95 ft. in 15 minutes, using ¼-in. chokes. Hole was drilled and cored ahead to 8,115 ft. where an electrical log was run, and operators are coring ahead, trying to pick up the 8,100-ft. sand which appeared in the discovery. This test is also credited with a new sand higher up in the hole carrying slight shows of oil at 7,312 ft.

W. L. Goldston 1 J. F. Kulcak, 2,700 ft. north of production at Needville field in Fort Bend County, in Robert Hodge Survey, has been completed as a gasser, making an estimated 3,500,000 to 4,000,000 cu. ft. of gas daily through a ¼-in. choke with 2,000 lb. pressure on tubing. Total depth is 6,605 ft. with 5½-in. casing set on bottom. Sand showing gas was topped at 5,970 ft. Perforations were made around 5,970-90 ft. for the test. An initial test made through perforations at 6,422-24 ft. flowed about 25 bbl. of 27° gravity oil daily through a ⅛-in. choke with 1,750 lb. pressure and a gas-oil ratio of 12,000 to 1.

The North Thompson field, Fort Bend County, has been extended 2,100 ft. northward by T. S. Loffland 1 Annie E. Williams et al, in Thos. Barnett Survey. Drilled to total depth of 8,154 ft., on potential test flowed 113 bbl. of 36° gravity pipe-line oil daily through a ⅛-in. choke, gas-oil ratio 454 to 1, tubing pressure 790 lb., casing pressure 1,010 lb. The 7-in. casing was cemented at 8,007 ft. and production is through perforations at 7,954-59 ft.

There were 12 new locations reported this week, 3 being wildcats, 1 each in Chambers, Liberty, and Matagorda counties. Of the 19 completions, 11 were oil and 8 dry holes, 4 being dry wildcats, 2 in Wharton County, and 1 each in Chambers and Harris counties. Wharton County led in activity, receiving six completions.

UPPER GULF COAST SUCCESSFUL WILDCATS

Matagorda County: New oil pool, Midfields discovery—Sun Oil Co. 2 Strnadel, I&GN Sur. 7, 18 mi. SW of Bay City, TD 9,477 ft., top sand 9,127 ft., perf. 9,134-36 ft., PT 229 bbl. per day through ⅛-in. choke, gas-oil ratio 1,314 to 1, TP 2,000 lb., 42° gravity, 0.1 per cent water.

UPPER GULF COAST WILDCAT FAILURES

Chambers County: Glenn H. McCarthy 1 E. A. Wilborn et al, Andrew Weaver League, Abst. 311, Hankamer area, dry at 7,948 ft.

Harris County: Jack W. Frazier 1 R. E. Brooks estate, 8 mi. NE of Houston, dry at 6,514 ft.

Wharton County: H. W. Snowden 1 J. B. Putman, WCRR Sur., Abst. 385, in North Louise gas area, dry at 5,510 ft.

Martin Thompson 1 J. J. Wiggington, E. and H. Bolten Sur., 6 mi. N of Louise, dry at 5,504 ft.

EASTERN TEXAS

Harrison County Wildcat Nearing Completion

DALLAS.—R. W. Williams 1 J. M. Furrh Est., Francis O'Neil Survey, Abstract 527, wildcat south of Waskom in Harrison County, plugged back to 6,330 ft. from total depth of 6,851 ft. On a test of the Travis Peak from 6,294-6,308 ft. the well flowed fresh water and an occasional head of oil and was making approximately 50 bbl. of oil in 24 hours with 2,000 lb. pressure. Operator is installing tanks for completion. Lone Star Producing Co. 1 Buckalow, A. Anglin Survey, on the west side of the Opelika field, Henderson County, perforated casing in the Pettit from 9,351-89 ft. This section was acidized with 2,000 gal. and showed gas and distillate. Casing was perforated in the Rodessa from 8,827-49 ft. and the well flowed a fair stream of oil through 2-in. tubing with an estimated 500,000 cu. ft. of gas. This zone was not acidized. Operator will reacidize Pettit with 5,000 gal. and test.

Phillips Petroleum Co. 1 Amelia Englander, Don Thomas Quevado Survey, wildcat 4 miles southwest of the South Tyler pool, Smith County, is dry at 13,781 ft. This test has been drilled as a "tight hole" and the only marker available is the Travis Peak topped at 10,365 ft. Magnolia Petroleum Co. 1 McCreight, Esparcia Survey, 4 miles south of Yantis, Wood County, is a failure at 9,003 ft. in the Travis Peak topped at 8,602 ft. Magnolia 1 Orr, Fowler Survey, wildcat 3½ miles southwest of Avinger, northwestern Marion County, was drilling below 9,090 ft. in the Travis Peak, having shown for a discovery in that formation.

Hawkins field, Wood County, and Carthage field, Panola County, each reported two completions this week. Hawkins field had eight locations and Carthage field three. Carthage field has 25 drilling wells, Hawkins field 24; New Hope, Franklin County, 6; Waskom field, Harrison County, and Pickton field, Hopkins County, each 5.

EASTERN TEXAS WILDCAT FAILURES

Harrison County: Rogers Lacy 1 Hayman Est., Ephriam Talley Sur., 2½ mi. W Marshall, dry at 7,506 ft.

Houston County: Fred M. Manning, Inc. 1 Houston Co. Lbr. Co., P. Mirando Sur., 4 mi. SE Weches, elev. 310 ft., Woodbine 6,030 ft., Buda 6,555 ft., dry at 6,718 ft.

CANADIAN FIELDS

Oil Strike Indicated in Southeastern Ontario

CHATHAM.—In Kent County, Ontario, Imperial Oil-Bechard 1, in Chatham Gore, 3 miles north of Wallaceburg, has encountered oil in the Salina formation at 1,859 ft. A bailing test indicated 25 bbl. daily of 36-gravity paraffin-base crude. The well is to be acidized to increase production.

The strike is the first commercial production encountered in the Imperial Oil drilling campaign in southwestern Ontario, launched last summer after exhaustive preliminary surveys. The company has approximately 100,000 acres under lease, selected after a careful study of available well logs, and 14 wells have been drilled, some of which have encountered showings. Plans contemplate the eventual acidization of all oil shows encountered.

The new strike is located west and south of the Dawn gas field in Lambton County, in an area previously regarded as unfavorable to oil production. The company's official announcement suggested the strike may portend the opening of an important field.

Results of the 5,200-qt. shot of nitroglycerin, set off in Westflank 2 in the old South Turner Valley field, may not be determined for a week or more. Pouring began on January 31, after elaborate preparatory work. The big shot was sponsored by Oil Well Reflow, Ltd. The explosion mechanism, set at 6,900 ft., began operating after sufficient water had been poured into the hole to bring pressure on the shear pins to 9 tons, breaking them off. Following the shot, water spurted 10 ft., the aluminum pipe was raised about a foot, and a 3-in. lead-in pipe was broken. The meter at Sterling-Pacific 3, nearest well to Westflank 2, registered no shock, though shocks were felt at a greate distance to the north and west, indicating the trend of the explosion was in that direction.

Alberta deep tests.—Three wells in the Alberta foothills are drilling below the 10,000-ft. level. On the Brazeau structure, in the central foothills, Home-Brazeau 1, LSD 5, 17-43-17w5, is nearing Madison limestone below 11,281 ft. and may establish a new Canadian depth record. Farther south, in the Stolberg area, Imperial-Shell 1, LSD 3, 22-41-14w5, is in Blairmore below 10,894

ft. South of Turner Valley, Co-Op 1, LSD 11, 22-17-2w5, in the Pekisko Hills area, is in Blairmore below 10,122 ft.

Kinsella.—In the Kinsella field, east of Edmonton, Imperial-Kinsella 5, LSD 7, 11-48-9w4, finished at 1,940 ft., is testing, with a good commercial gasser indicated. Imperial-Kinsella 7, LSD 7, 22-49-10w4, is drilling, and there are three other locations.

Notikewin River.—A new potential oil area in northern Alberta will be surveyed by Anglo-Canadian Oil Co. of Calgary which has secured crown reserves on three areas totaling 483,000 acres on the Notikewin River 35 miles north of Peace River. Permits comprise Townships 90 to 95, Ranges 21 to 23w5, holdings being about 12 miles north of the Peace River field where extensive drilling in 1916-20 encountered numerous oil shows with gas and heavy flows of salt water.

Davidson.—In central Saskatchewan, between Regina and Saskatoon, Imperial-Davidson 1, LSD 16, 8-27-1w3, has been abandoned at 5,234 ft. Imperial-Davidson 2 is starting in LSD 13, 10-27-2w3, about 4 miles to the west.

CALIFORNIA

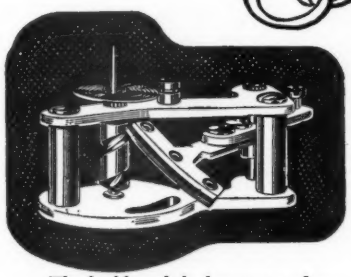
Water Cut Dims Outlook at Three Important Wildcats

LOS ANGELES.—California's three outstanding wildcats were given tests this week and the results left much to be desired as water cuts in excess of pipe line requirements makes it difficult to estimate the probable importance of each from a future production standpoint. Richfield Oil Corp. after spending several months attempting to overcome a water problem in 1 Union Pacific Unit plugged back from 9,629 ft. to 8,590 ft. and put it on production. The wildcat's initial daily production was 154 bbl. of 32.1-gravity oil cutting 76 per cent but a day or so later production declined to 110 bbl. and the water cut rose to 82 per cent. Because of the company's inability to exclude water it is quite probable that the cut is formation water. In addition to the sand now being produced, Richfield found another oil sand in the bottom of the hole but it could not be produced. South of Richfield's Union Pacific Unit wildcat and and the same company's Vail wildcat, Chanslor Canfield Midway Oil Co. is nearing 9,000 ft. and appears to be running substantially lower structurally.

In the Leffingwell district between Santa Fe Springs and West Coyote, Standard has completed 1 Lewis Community in Section 11-3s-11w, pumping 67 bbl. of 31.6-gravity oil daily from 6,920 ft. This wildcat which the company had hopes of completing as a commercial producer around 10,000 ft. is producing from 20 ft. of formation found but not tested during drilling operations. After failing to develop production at 10,000 ft., the company drilled ahead to 12,184 ft. but found the lower part of the hole too tight. This wildcat is cutting 17 per cent water. In the meantime, Standard is preparing to resume work on 1 Behnke, which was drilled and abandoned by another operator in Section 14-3s-11w, at 9,034 ft. The latter well is north and west of Standard's Lewis wildcat and the point at which the 10,000 ft. sand is encountered should enable Standard to locate a third well at a high point structurally.

The third of the trio of wildcats to be tested this week was General Petroleum's 1 Iibrown at La Mirada in Section 21-3s-11w. This wildcat which is located about 3 miles southwest of Standard's Lewis wildcat at Leffingwell flowed 187 bbl. per day through a tester. Proruction is showing some water but it is too early to estimate how much is drilling fluid. General Petroleum has been working on this wildcat for several months and while the well flowed for several days some time ago it lacked suffi-

75,000,000 IS A LOT



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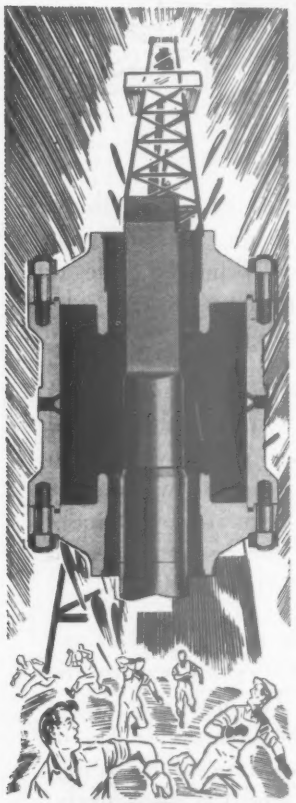
cient gas pressure to show large production Water in this wildcat has never been entirely eliminated but the well is capable of producing around 75 bbl. per day. Bottom of the hole is at 12,600 ft. but production is coming from 11,617 ft.

The Cymric field in Kern County is rapidly becoming of considerable importance from a drilling and production standpoint. Two excellent flowing wells were finished this week and both recalled days when large flowing wells were the rule rather than the exception. Standard's 33 Weston in Section 26-29s-21e, which extended the Oceanic sand of Miocene age to the Anderson area about 1 mile southeast, established an open flow test of 3,000 bbl. per day before being beaned back to 500 bbl. daily. The Carneros and Kreyenhagen in the bottom of the hole at 4,941 ft. were wet. Independent Exploration Co. which discovered the Oceanic sand northwest of the Anderson area where Union Oil Co. proved up a prolific zone last year completed another excellent flowing well on the Oceanic property. The company's second well showed a potential of 4,000 bbl. daily through the annular space between tubing and casing and when the flow was reversed the well made 500 bbl. daily through tubing with a 14/64-in. bean. These excellent flowing wells indicate the probability that Cymric will reach higher production levels later in the year. Superior's 67 Woody in Section 22-29s-21e, is believed to have found an oil sand in the underlying Eocene but this can not be confirmed because of Superior's reluctance to disclóse the results of tests below the Oceanic sand. The withholding of geological data has become common practice again in California after 10 years of cooperative work.

CALIFORNIA WILDCAT FAILURES

Fresno County, Helm: General Petroleum 2-30 Community Seven, 30-17s-19e, bottomed in gray sand, all sands barren, TD 7,200 ft.

Kern County, Antelope: Miller & York 2-A Theta, 12-28s-19e, bottomed in hard gray sand, top Pyramid Hills sand 997 ft., all sands barren, TD 1,063 ft.



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N. CENTRAL TEXAS

Young County Wildcat Flows Oil on Test

WICHITA FALLS. — Hanlon-Buchanan, Inc., 1 Kendale, J. Crosby Survey, Abstract 1722, wildcat 5 miles northwest of Eliasville, southern Young County, on a 30-minute drill-stem test in the Caddo from 3,466-76 ft. had gas to the surface in 1 minute and flowed oil in 3 minutes and recovered 360 ft. of free oil. A 60-minute drill-stem test from 3,476-81 ft. had gas in 1 minute and sprayed oil in 11 minutes and recovered 15 bbl. of new oil. Operator is cementing casing in preparation for completion. A. F. Knappenberger et al 1 Rogers, Section 256, TE&L Survey, Abstract 503, west extension to the Prue Strawn pool of northern Young County, logged sand showing oil from 2,619-27 ft. Casing was set at 2,619 ft. with 250 sacks. Operator is waiting on cement.

Superior Oil Co. 1 Pitchfork Land & Cattle Co., Section 171, J. H. Gibson Survey, wildcat 12 miles northwest of Guthrie, King County, made a 1-hour drill-stem test from 5,341-63 ft. Recovery was 250 ft. of mud and 1,954 ft. of salt water. It is dry at 7,145 ft. in granite. S. D. Johnson et al 1 Claude Willis, S. Cary Survey, Abstract 1142, wlidcat 2½ miles north of Forrestburg, Montague County, ran a 30-minute drill-stem test from 6,831-48 ft. and recovered 600 ft. of salt water and a trace of oil. It was drilling below 6,921 ft. in shale.

Gatewood field, Cooke County, reported four completions this week, Holliday field, Archer County, three and KMA field, Wichita County, two. Thomas and Daume fields, Archer County, Gatewood field, Cooke County, and West field, Wichita County, each had two locations. Cooper field, Archer County, has nine drilling wells; Sivells Bend, Cooke County, eight; Nocona field, Montague County, six; Lupton and Knox fields, Young County, each five and National field, Wilbarger County, four.

NORTH CENTRAL TEXAS SUCCESSFUL WILDCAT

Wilbarger County: New oil pay—National Assoc. 4-A Sam Kelly Est., Sec. 30, Blk. 13, H&TC Sur., National pool, elev. 1,210 ft., pumped 160 bbl. day, perf. 4,455-78 ft. Caddo, gravity 40.° TD 4,925 ft.

NORTH CENTRAL TEXAS WILDCAT FAILURES

Archer County: Bridwell Oil Co. 2 W. P. Ferguson, Blk. 9, KWVFL Sur., 1 mi. W and 2 mi. N Mankin, dry at 1,850 ft.

Clay County: Paul, Briscoe & Ferguson 1 W. L. Malone, E. E. Brannon Sur. A-37, 2 mi. S Charlie, dry at 1,323 ft.

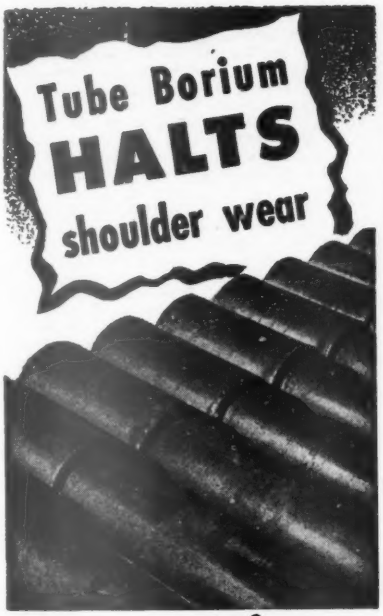
Jack County: Ratke Oil 1 J. P. Carnahan, Blk. 2, Henderson CSL Sur., 1 mi. E Joplin, elev. 1,094 ft., dry at 4,525 ft.

J. M. Hickey 1 Chas. E. King, Sec. 3310, TE&L Sur., 2½ mi. NE Jermyn, elev. 1,124 ft., dry at 321 ft.

Montague County: Continental 1 Geo. Jarrell et al, Sec. 3433, TE&L Sur., 8 mi. S Bowie Station, elev. 941 ft., Caddo 5,705 ft., Ellenburger 6,690 ft., dry at 7,095 ft.

S. D. Johnson 1 Bonnie C. Rich, W. S. Harkin Sur., 3 mi. N and 1 mi. W Belcherville, elev. 858 ft., Caddo 5,545 ft., dry at 6,033 ft.

Fred B. Manning, Inc., 1 D. W. Sewell, Lot 184, Belcher subd., 5 mi. S and 1 mi. E Belcherville, elev. 969 ft., Caddo



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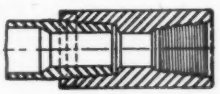

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5,912 ft., Viola 6,320 ft., dry at 6,360 ft.
Wilbarger County: Humble 1 McClintock, Blk. 10, Sec. 22, H&TC Sur., 3 mi. SW Odell, elev. 1,355 ft., dry at 7,130 ft.

WEST CENTRAL TEXAS

ABILENE.—Ashland Oil & Refining Co. 1 S. F. Lee, Block 1744, TE&L Survey, 2 miles northwest of Graford, Palo Pinto County, is a possible discovery from the Ellenburger. It drilled dolomite showing oil from 5,038-46 ft., total depth, drilling was halted and casing was set at 5,035 ft. When the plug was drilled, the hole filled 1,500 ft. with drilling fluid in 24 hours and the operator was bailing 1½ bbl. of oil and 2 gal. of water an hour.

Shackelford County Regular field and Stephens County Regular field each reported two completions this week. These two fields and the Jones County Regular field each had one location. Jones County has 14 drilling wells and Shackelford County 10.

WEST CENTRAL TEXAS WILDCAT FAILURES

Coleman County: Onyx Refining Corp. 1 J. P. Hall, L. H. McNeil Sur. No. 230, 7 mi. NW Burkett, elev. 1,673 ft., Caddo 2,785 ft., dry at 3,050 ft.
Jones County: Crown Central Pet. Corp. 1 A. A. Hayden, G. Martinez Sur. No. 195, 2 mi. NW Hawley, elev. 1,710 ft., Gunsight 2,401 ft., dry at 2,570 ft.
Eason Oil Co. 1 Annie Thomas, Sec. 28, Blk. 15, T&P Sur., 3¾ mi. NE Hawley, elev. 1,697 ft., Swastika 2,305 ft., dry at 2,443 ft.
Eltex Ltd. 1 Claude Russell, DeWitt CSL Sur. No. 125, 2 mi. SW Smith, elev. 1,786 ft., dry in Swastika at 2,920 ft.
Humble 1 A. B. Cransten, Sec. 18, Blk. 17, T&P Sur., 3 mi. SW Truby, elev. 1,744 ft., dry in Palo Pinto at 4,000 ft.
Stephens County: W. R. Skeen 1 C. R. Compton, Sec. 2254, TE&L Sur., 4 mi. SE Eolian, elev. 1,251 ft., Ellenburger 4,176 ft., dry at 4,328 ft.
Westheimer-Neustadt 1 Graves Est., Sec. 90, Blk. 4, T&P Sur., 3 mi. SE Lacasa, elev. 1,516 ft., Ranger 3,688 ft., dry at 4,045 ft.

MICHIGAN

Winter Weather Slows Michigan Operations

SAGINAW.—Midwinter has brought Michigan oil field operations to a seasonal low, only seven completions being recorded in the past week while new locations numbered but three. Of the three producers on the list which included four wildcat tests, one is a discovery well in NW SW SE 3-12n-8w, Cato township, Montcalm County. A Union Drilling & Producing Co. well, it flowed 93 bbl. and salt water from the Monroe after acid treatment at 3,554 ft. The other wells are small producers in Barry and Bay counties. New locations are in Wright township, Ottawa County; Dorr township, Allegan County; and in Heath township, Allegan County.

MICHIGAN SUCCESSFUL WILDCAT

Montcalm County, Cato Township: Union Drilling & Producing Co. 1 Douglass, NW SW SE 3-12n-8w; acidized for 93 bbl., with salt water, in Monroe formation; TD 3,554 ft.

MICHIGAN WILDCAT FAILURES

Gratiot County, Sumner Township: Ray C. Andrews 1 O. Seman & C. Smead, NW NW NE 29-11n-4w; dry; TD 1,042 ft.
Newaygo County, Troy Township: M. B. Beldon 1 Fawcett & Beldon, NE NE NE 33-16n-14w; dry in Dundee; TD 2,859 ft.
Van Buren County, Porter Township: C. W. Collin A-1 John Hughes, SW SW NE 22-4s-13w; dry in Traverse Limestone; TD 1,217 ft.

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ILLINOIS

Devonian Saturation Found In Mattoon Field

MATTOON.—Outstanding development in the Illinois Basin during the past week was the recovery of possible commercial oil saturation in the Devonian limestone in the Mattoon field of Coles County. The National Consumers Oil Co. 3 M. B. Herkimer, SW NE NE 11-12n-7e, has set pipe to test 3½ ft. of Devonian saturation encountered between 3,117-70 ft., total depth 3,170.

Although it is too early to appraise the significance of a Devonian discovery at Mattoon, operators received the news with mingled feelings. Many remember the flood of oil that came from the Devonian at Salem and Centralia and its effects on the Illinois crude market. Even if prolific production were developed at Mattoon, the effect on the present market would be doubtful due to present OPA control. However, Illinois production has been on the decline for the past few years, and a discovery at Mattoon might help the state regain its former rank among the oil-producing states of the nation.

Meanwhile, H. C. Hageman et al 1 R. J. Tivnen, NW SW SW 26-13n-7e, another Coles County wildcat, was cleaning out and testing the Rosiclare at 1,924-38 ft., total depth 1,956 ft. On previous tests the well recovered water and a slight show of oil. It has been shot with 120 qts. No other wildcats in the basin area had reached important stages of development last week and the majority of them were drilling ahead.

Oil drilling activity in Illinois in January centered in the Mattoon pool, where 37 producing oil wells were completed during the month, according to a report just released by the Illinois State Geological Survey. This is the greatest number of wells to be completed in any single Illinois pool during one month since the Salem pool drilling in 1940. In addition to accounting for 40 per cent of the newly completed wells, the Mattoon pool area contains over one-third of all wells currently drilling in the state.

One new pool, the Hoosier pool, a Cypress sand discovery in Clay County, was discovered in January. An extension to the Stokes pool of White County was completed in the Hardinsburg sandstone, a new pay horizon for this pool. It seems probable that drilling activity stimulated by this extension will result in the consolidation of the Stokes pool with the Brownsville Hardinsburg sand pool a short distance north of it. Rosiclare lime production was reported for the first time from the Ingraham North pool of Clay County in a well which flowed initially 764 bbl. of oil.

ILLINOIS SUCCESSFUL WILDCAT

Clay County: Deep Rock Oil Corp. 1 Ed Given, NW NW SE 4-2n-6e, pumped 189 bbl. oil, 4,000 gal. acid, McClosky 2,978-84 ft., TD 2,988 ft.

ILLINOIS WILDCAT FAILURES

Clark County: B. A. Baker 1 Williams, SW NE SW 20-10n-13w, dry at 2,998 ft., Ste. Genevieve 605 ft., Devonian 1,737 ft., Trenton 2,891 ft.

Clinton County: Schlafly 1 Schlafly, SW SW NE 18-2n-1w, dry at 1,630 ft., Menard 886 ft., Waltersburg sand 993 ft., Glen Dean 1,074 ft., Golconda 1,136 ft., Barlow lime 1,223 ft., Cypress sand 1,280 ft., Benoist sand 1,404 ft., Ste. Genevieve 1,534 ft.

Coles County: Jarvis Bros. & Marcell 1 J. G. Watson, NW NE SW 4-12n-9e, dry at 2,239 ft., Glen Dean 1,834 ft., Barlow lime 1,926 ft., Cypress sand 1,968 ft., Renault 2,113 ft., Aux Vases sand 2,122 ft., Ste. Genevieve 2,160" ft.

Effingham County: Mitchell et al 1 Uthill, NW SW SE 11-8n-6e, dry at 2,550 ft., Glen Dean 1,969 ft., Golconda 2,015 ft., Barlow lime 2,093 ft., Cypress sand 2,135 ft., Paint Creek 2,247 ft., Renault 2,316 ft., Aux Vases sand 2,324 ft., Ste. Genevieve 2,406 ft., Rosiclare sand 2,434 ft., Fredonia 2,360 ft., McClosky 2,482 ft.

Marion County: S. H. Leavitt 1 Magill, SW SW NW 4-2n-4e, dry at 2,814 ft., Menard 1,940 ft., Glen Dean 2,168 ft., Barlow lime 2,339 ft., Cypress sand 2,355 ft., Weiler 2,378 ft., Benoist 2,518 ft., Ste. Genevieve 2,655 ft., Fredonia 2,689 ft., McClosky 2,100 ft.

Wayne County: J. J. Lynn 1 S. Ellis, SE SE NW 34-1s-8e, dry at 3,330 ft., Tar Springs sand 2,554 ft., Glen Dean 2,653 ft., Golconda 2,749 ft., Barlow lime 2,848 ft., Cypress sand 2,853 ft., Weiler 2,933 ft., Paint Creek 3,014 ft., Benoist 3,080 ft., Renault 3,117 ft., Aux Vases sand 3,131 ft., Ste. Genevieve 3,192 ft., Fredonia 2,250 ft., McClosky 3,264 ft.

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LA.-ARK.

Longwood Gas Pool May Be Extended to North

SHREVEPORT.—A possible north extension to the Longwood gas pool, Caddo Parish, North Louisiana, is the Phillips 1 Waskom, SW SW 29-19n-16w. Operators set pipe at 6,212 ft. and were testing the Leake sand.

A wildcat test, with 11 bbl. of oil and 300,000 cu. ft. gas recovered at 7,406 ft., may open a new pool in Prairie County, Arkansas. The well is the McAlester Fuel Co. A-1 Z. P. Duncan, SE NW 10-17-19, Village field. Operators are preparing to rework test.

Operations have begun on another wildcat, the M. W. Martin et al 1 Stewart, NWS

3-3n-5w, in Prairie County, Arkansas. The well has been spudded.,

NORTH LOUISIANA WILDCAT FAILURES

Bienville Parish: R. T. Sellehs 1 Dan McKay, 330 ft. north and east of southwest corner of SW SE of 11-16n-7e, dry at 3,400 ft.

Caddo Parish: Big West Drilling Co. 1 C. L. Ellerbe, 2,000 ft. south and 660 ft. west of northwest corner of 27-15n-12w, dry at 9,605 ft.

Natchitoches Parish: E. H. Demetric 4 Prudential Life, 360 ft. south and 350 ft. west of northeast corner of SE of 16-10n-9w, dry at 1,320 ft.

ROCKY MOUNTAIN

Rangely West Extension May Make Large Well

DENVER.—Continental Oil Co. 1 Dorothy Rooth, C NW SW 15-2n-103w, outpost in the Rangely field 1½ miles northwest of the nearest producer, a key well in indicating the potential productive area of the field, is definitely classed as a producer as it continues to core into the Weber sand. It not only extends the area of the field, but gives the appearance of being an excellent well. After topping the Weber at 6,581 ft. and coring to 6,596 ft., where it stopped to run the 7-in., it cored down to 6,658 ft., at which depth a drill-stem test at 6,608-58 ft. was taken. With the valve open 20 minutes, it filled 45 stands of oil that was entirely free from water. While this indicated that the well may rank among the largest producers in the field, estimating its capacity on the basis of the test was discouraged as the recovery was through the 3-in. drill pipe and 2½-in. tubing with connections slightly impeding the rate at which the oil came in. Coring then was resumed and at last reports it was still in saturated sand at 6,661 ft. Connection with the field gathering system is being constructed and all doubt about the well being a producer has been dispelled. Last week, when it first began showing oil, the first estimates placed the additional reserves at between 4,000 and 5,000 acres, and in this column the figure used was "at least" 4,000 acres. Subsequent checks by the engineers have raised the area potentially proven to 6,300 acres, bringing the total for the field up to 27,400 acres. Stanolind, California, Equity, and Husky Refining are among the companies which will profit by the extension.

South extension at Rangely.—Wasatch Oil Refining-Newton Oil Co. 2-D Gentry, SW NE 3-1n-102w, located 7½ miles southeast of the Rooth well and an outpost on the south, is still cleaning out and trying to overcome difficulties arising from a shot with 1,500 quarts last September which badly shattered the formation and interfered with completion. While the cleaning out is in progress it is making 80 to 100 bbl. per day. As it is located on a higher contour than the Rooth well, it is now considered safely within the productive area.

Zimmerman Butte well shows oil.—Pacific Western Oil Corp. 1 Government, near C SE 35-44n-93w, Hot Springs County, Wyoming, which was drilled ¼ mile northwest of its Embar sand oil discovery last year to test horizons passed up in the deep test, has developed possibilities for a discovery in the Frontier. Three weeks ago it was tested in the Frontier through perforations at 1,115-20 ft. and bailed the hole dry. After standing 30 minutes it showed approximately 6 gal. of emulsion, 50 per cent light oil and 50 per cent rotary mud and water with a small show of gas. Rotary was moved out and it was reported a dry hole. However, after it had been shut in for 15 days it was opened and found to have filled up 800 ft. with light green 35.3-gravity crude and no water or basic sediment. A swabbing test is under way to determine the importance of the showing. Top of Frontier was at 1,115 ft., and total depth 1,123 ft. It did not drill to the Morrison as originally projected.

Cat Creek disappointment.—Two dry holes in the Ellis offsetting a recent 1,200-bbl. completion in the Cat Creek field, Montana, dampened the enthusiasm caused by the discovery in Schrock's 1 Fifer last fall. Pacific Petroleum 3 Charles, SE SE NW 21-15n-30e, a north offset to Spencer & Livingston 5 O'Dea, which came in flowing 50 bbl. an hour, topped the Ellis at 1,435 ft., and was drilled to 1,438 ft., where it flowed water inside and outside the 7-in. at 1,432 ft. It was plugged and abandoned. Same company's 4 Charles, west offset to 3 Charles, also had water and was abandoned at 1,417 ft. V. M. Kirk 1 Butler, NW NW SE Section 21, an east offset to the 1,200-bbl. well, was completed as a producer, making 8 bbl. per hour. It had the top of the Ellis at 1,315 ft., and was drilled to 1,335 ft.

New operations.—Only four new operations were reported, of which two are wildcats. The others are one by Wasatch Oil & Refining Co. in the Rangely field and one by Continental Oil Co. in Lance Creek. The wildcats are both in Wyoming. Forest Oil Co. has spudded in a test on Squaw Creek, Fremont County, in 1 Cooley, SW SE SE 29-33n-100w. The Continental Oil Co. will drill a 5,000-ft. test to the Embar-Tensleep on the Corley structure, Hot Springs County, in 1 Vannoy, NE SW NE 3-43n-93w. Contract has been let to Dyer & Rice.

Two additional wildcats not included in the above are starting up. Union Oil Co. 1

(Continued on page 166)

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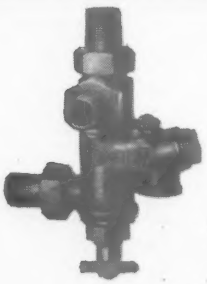

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OKLAHOMA

Pool Opener Rated at 600 Bbl. Oil Daily

SINCLAIR PRAIRIE OIL CO. et al 1 Teuscher, SE SE SW 34-15n-1w, discovery well north of Arcadia, has been rated as a 600-bbl. producer after flowing better than 27 bbl. an hour for 5 hours. Actual production over the 5-hour test period was 138.2 bbl. of 37-gravity oil through open 2½-in. tubing. The well has shown no salt water and the gas is sufficient to produce the oil. It has been shut in since Saturday for tankage.

The well had saturation and staining in the Dolomite, topped at 5,800 ft., and in the first Wilcox topped at 5,819 ft., but is being completed with only the second Wilcox exposed at 5,929-41 ft., total depth. Geophysical surveys have indicated that the Teuscher is near the north end of the structure.

Direct offsets to the discovery well will be staked immediately and a development program will get under way as soon as property owners approve a drilling program. It has been reported that 20-acre spacing will be asked for a large part of the area.

Stanolind Oil & Gas Co. et al have set casing to test the Bartlesville sand in their 1 Horn, NE NE NE 22-8n-1w, Cleveland County wildcat. The Bartlesville sand was topped at 6,391 ft. and a drill-stem test at 6,389-6,410 ft. recovered 60 ft. of oil-cut mud and 15 ft. of salt water. The well was drilled ahead through the first and second Wilcox sands to a total depth of 7,300 ft., but was plugged back to 7,168 ft.

OKLAHOMA WILDCAT FAILURES

Canadian County: Ace Gutowsky 1 Hoover, SE SW 14-14n-5e, dry at 7,553 ft., Chimney Hill 7,429 ft.

Carter County: Joseph H. Belser 1 Lester, SE SE SW SE 19-3s-2w, dry at 450 ft.

Creek County: Liberty Glass Co. 1 Taylor, NE SE SW 11-18n-11e, dry at 1,910 ft., Mississippi 1,910 ft.

Garvin County: Tide Water 1-A Prince, SW SE SW 31-1n-2w, dry at 2,700 ft., second Bromide sand 2,004 ft.

Logan County: L. A. Johnson 1 Bircket, SE SE 26-19n-2w, dry at 5,528 ft., Wilcox 5,494 ft.

Okfuskee County: Zephyr Drilling 1 Trow, NW NE SW 6-11n-10e, dry at 3,374 ft., Cromwell 3,331 ft.

OHIO, KENTUCKY

Ashland County Wildcat Opens New Gas Field

COLUMBUS.—Ohio Fuel 1 O. S. Vance, Sec. 29, Hanover Township, Ashland County, indicates a new gas pool in the southwest part of the Township. Clinton sand gaged 700,000 cu. ft. natural with 1,180 lb. pressure.

The Central States Construction Co. 1 Fee, Sec. 4, Swan Township, Vinton County, a wildcat, was drilled 14 ft. in the Clinton, topped at 2,819 ft. with a gage of 1,330,000 cu. ft. The well is now shut in on the casing.

Atha 1 Clyde Drum, Sec. 15, Madison Township, Perry County, was drilling through the Clinton sand with 1,070,000 cu. ft. of gas. Top of Clinton sand 3,245 ft. and pay at 3,280 ft.

The John Morrow 1 Lola Coulter, test in Sec. 25, Hopewell Township, Perry County, was drilled through the sand, shot, and shut in 10 minutes after. The well will not be tested until a gas line is laid.

A wildcat test was located in Ellsworth Township, Mahoning County, by Smith and Galey on Cramer, Sec. 14. Seventeen other locations were reported with 7 in the Ashland field. Of the 26 completions Ashland had 6, Cambridge 5, and Sandyville 4.

OHIO SUCCESSFUL WILDCATS

Ashland County, Hanover Township: Ohio Fuel 1 O. S. Vance, Sec. 29, Clinton 2,746-51 ft., 61,000 cu. ft.; Clinton 2,772-79 ft., 639,000 cu. ft., TD 2,786 ft.

Trumbull County, Vernon Township: Hickman et al 1 J. B. Everett, Lot 6, Oriskany 3,306-32 ft., 8 bbl., TD 3,336 ft.

EASTERN KENTUCKY

ASHLAND.—Pike and Knott counties came in for top activity in the eastern Kentucky field of operations during the past week marking the first gas production of any consequence in the new year.

A new listing on the Kentucky-West Virginia Gas Co. charts showed completion of well No. 796 on the Ballard Weddington property in Pike County, total depth 1,862 ft., with daily open flow of 2,475,000 cu. ft. in Maxon.

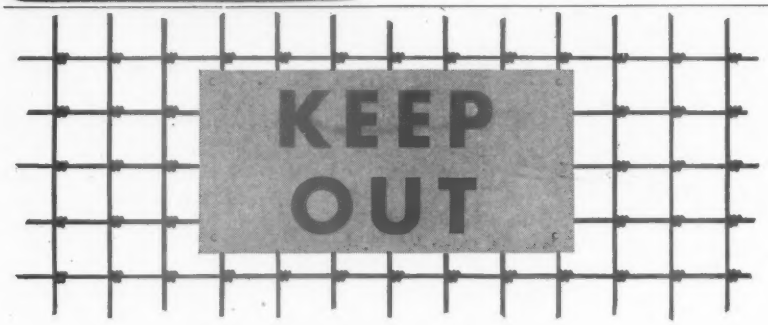
Kentucky-West Virginia Gas Co. completed well No. 786 on the S. B. Leslie property, Pike County, total depth 2,990 ft., with 60,000 cu. ft. in shale an 26,000 in the Big lime.

Kentucky-West Virginia Gas Co. completed well No. 5605 on the Elijah Combs property, Knott County, total depth 3,131 ft., with 133,000 cu. ft. in shale.

Kentucky-West Virginia Gas Co. completed well No. 5618 on the William Kelly property, Knott County, Total depth 3,288 ft., with 133,000 cu. ft. in shale.

WESTERN KENTUCKY

OWENSBORO.—Activity in the Western Kentucky area was quiet during the past week with no outstanding developments reported. The majority of wildcats were



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drilling ahead with only one near the testing stage. It is the Calstar Petroleum Co. 1 C. Blake, 22-P-20, Union County, where operators have pipe set through poor Cypress at 2,297-2,307 ft. and McClosky at 2,589-94 ft.

Also in Union County, the South Penn Oil Co. 1 C. C. Stevenson, 14-N-18, is bailing to resume drilling. This is a cable-tool rig and present total depth is 3,131 ft. A good show of oil was encountered in the Cypress sand at 3,060 ft. and a slight show was found in the Bethel lime at 3,128 ft.

One of the best completions in Western Kentucky in several weeks was reported during the past week. It was the Carter Oil Co. 2 J. C. Hancock, 4-O-21, in the Hitesville pool of Union County. The 2 Hancock was completed in the McClosky lime at 2,568-71 ft. for 1,104 bbl. of oil daily.

Total completions for the week amounted to two oil wells and two dry holes. Only four new operations were reported, all in Henderson County.

INDIANA

EVANSVILLE.—A new pool was in prospect for Gibson County at the close of the week. John Kabana & L. A. Plumb 1 Coleman Community, SW SW NW 7-2s-9w, was running an electrical survey to 1,925 ft. after a 1-hour drill-stem test of the Rosiclare at 1,797-1,803 ft. recovered 390 ft. of gas, 60 ft. of clean oil, 60 ft. of oil-cut mud and 120 ft. of drilling mud. The Rosiclare in this well was sandy limestone. The 1 Coleman is about 1½ miles north of production in the Princeton field.

About 8 miles north of Princeton, Pike County, W. L. Lichlyter et al 1 Ray Johnson, NE NE SE 9-1s-9w, is cleaning out after a 20-qt. shot in the Cypress sand at 1,393-1,405 ft. The well was drilled to a total depth of 1,405 ft. and stopped in oil-saturated sand. At present there is 700 ft. of oil in the hole, and it is showing for about a 60-bbl. well. It is approximately 1½ miles from other oil production and shows good prospects of opening a new pool.

Indiana completions showed a slight gain over the previous week with seven oil wells and 1 dry hole, a wildcat in Gibson County. New operations for the week totaled 13, of which 6 were in Posey County, 5 in Gibson County and 1 each in Pike and Spencer counties.

INDIANA WILDCAT FAILURE

Gibson County: C. E. Skiles 1 Stein, SE SW SE 35-1s-12w, elev. 395 ft., dry at 2,358 ft., Menard 1,534 ft., Glen Dean 1,828 ft., Barlow 1,981 ft., Ste. Genevieve 2,295 ft., Rosiclare 2,308 ft., 1-hour drill-stem test at 2,288-2,310 ft. recovered 300 ft. of gas, 13 ft. oil and 30 ft. oil-cut mud with no water.

APPALACHIAN FIELD

Heavy Producer Completed In Northwest Pennsylvania

PITTSBURGH.—The South Penn Oil Co. has hit another big gas producer in the Guffey field near Kane, McKean County, according to reports received during the past week. The new well, drilled in the Haskile sand, is reported to be producing better than 2,000,000 cu. ft. daily. It is the latest of a series drilled by the South Penn Co. in the newly opened field in which several wells have been estimated at more than 1,000,000 cu. ft. daily and one above the 4,000,000 cu. ft. mark.

In Center district, Wyoming County, West Virginia, United Producing Co. completed another good Berea gas well with 1,306 W. M. Ritter Lumber Co. which had a final open flow after shot at 1,715,000 cu. ft. gas. The Big Lime was topped at 2,305 ft., Injun sand 2,710 ft. and Berea 3,356-78 ft. Six other wells are drilling on this tract which extends into Baileysville district.

In Union district, Wood County, W. H. Bickel completed No. 4 G. H. Ralston heirs, which gaged 1,555,000 cu. ft. gas from the Berea, total depth 2,045 ft.

In Logan district, Logan County, Columbian Carbon Co. completed 821 Island Creek Coal Co. at a total depth of 2,051 ft. for 782,000 cu. ft. gas after acidizing with 1,500 gal. in the gas pay at 1,966 ft., or above the Big Lime. It had a rock pressure of 370 lb. in 48 hours.

In Elk district, Kanawha County, A. C. Radford et al in a test on Dan Robertson heirs lease, has 600,000 cu. ft. gas in the Weir sand topped at 1,962 ft. The gas pays were at 2,055 ft. and 2,127-31 ft. It is now drilling at 2,438 ft.

During the week 13 new locations were announced scattered in Washington district, Boone County; Grant district, Cabell County; Glenville district, Gilmer County; Ravenswood district, Jackson County; Elk district, Kanawha County; Logan district, Logan County; Browns Creek district, McDowell County; Teays Valley district, Putnam County; Slab Fork district, Raleigh County; Murphy district, Ritchie County; Harper district, Roane County; Banks district, Upshur County.

In southwest Pennsylvania, the important test of Peoples Natural Gas Co. on the Camilla Giffin farm in Fairfield Township, Westmoreland County, is drilling in black shale at 6,918 ft., or 586 ft. below the top of the Tully lime. From convergence it appears running normal but as there is nothing close with which to correlate it, the top of the Onondaga lime is being awaited with interest. On this structure, 2 other tests were thrown very low by faulting.

POWER WHEEL

It is now lighter, stronger, and more efficient. Slightest pressure of fluid puts the Thompson machine in operation.

EFFICIENTLY HANDLES THE FLOW OF MUD FROM LARGEST PUMPS NOW IN OPERATION

The new Thompson "DW" Model is the ideal mud conditioner for your larger operations. Its capacity has been increased to the extent that it will handle the mud and pressure from the largest mud pumps now in operation. The Power Wheel has been redesigned and increased in size for greater efficiency.

This new model is Self-Motivated, a feature pioneered by Thompson—operates entirely from the flow of mud. The Sample Machine is standard equipment, unless otherwise specified . . . It's the field-tested method of providing accurate samples of foot by foot cuttings.

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- UNLIMITED CAPACITY

Your order can be filled promptly, so place it now!

THOMPSON TOOL CO.

IOWA PARK, TEXAS

KEEPS DRILLING MUD CLEAN — PROVIDES TRUE SAMPLES OF CUTTINGS

*the Drilling Supt.**

Ask about pressure gauges

HE knows what a pressure gauge is up against. As one drilling superintendent put it: "What puzzles me is how Marsh has managed to turn out a gauge that can stand so much vibration and pressure surge . . . and still *stay* right!"

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Yes, in the Marsh Mastergauge you have an instrument made for the oil industry's tough grind—a gauge with a lathe-turned and reamed bourdon tube—a gauge with an advanced monel and stainless steel movement—a gauge that is vapor-proof, moisture-proof, trouble-proof. If it is ever knocked out of adjustment (which you won't find easy to do) the Marsh "Recalibrator" enables you to readjust it in a jiffy right in the field.

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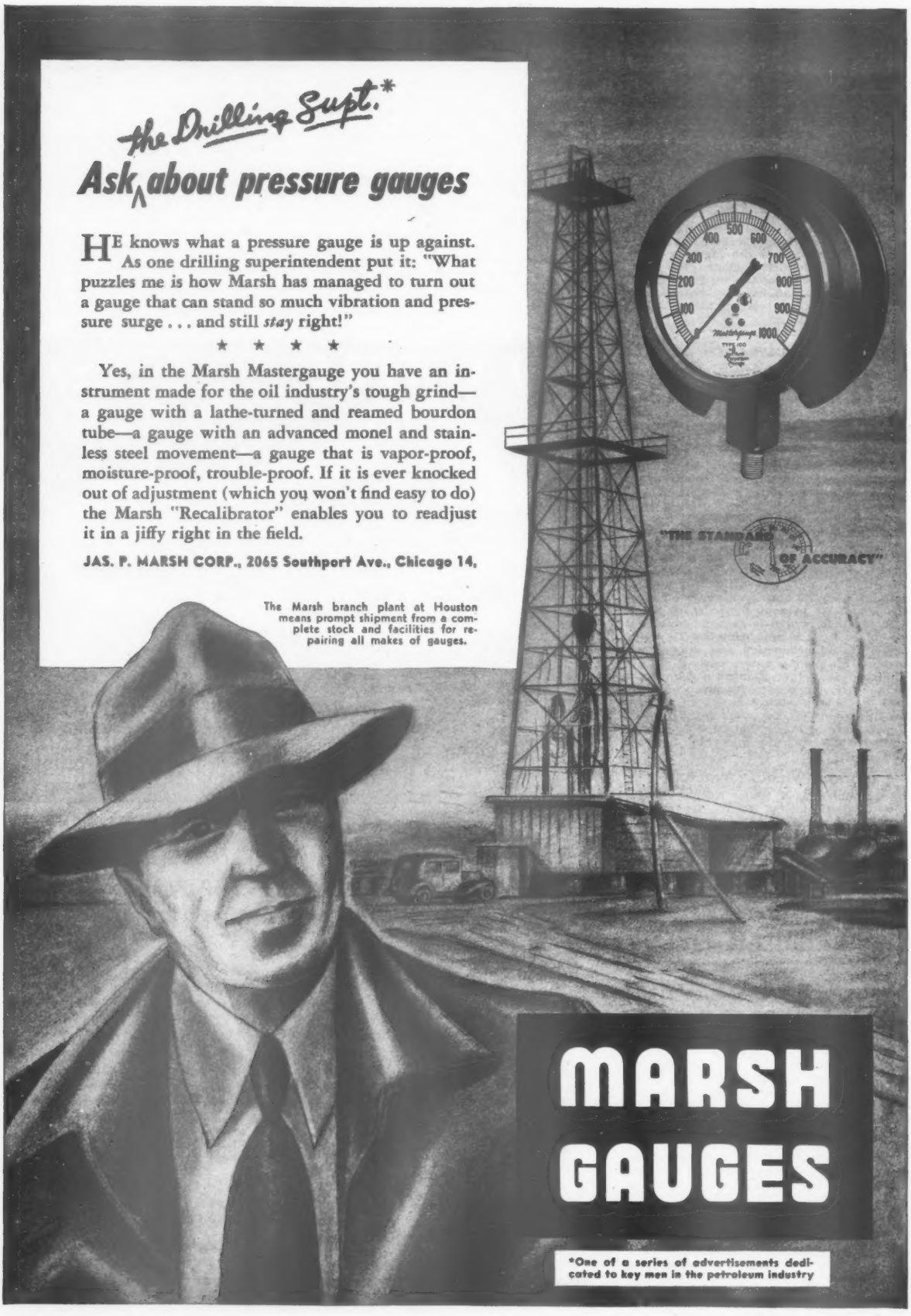

*One of a series of advertisements dedicated to key men in the petroleum industry

PERMIAN BASIN

TXL-Ellenburger Extension Completed for Large Flow

MIDLAND—The Texas Co. 1-D Fraser, Section 27, Block 45, T-1-S, T&P Survey, 1-mile extension to the TXL-Ellenburger pool of western Ector County, has been completed to flow 1,696 bbl. of 41.9° gravity oil daily through perforations from 10,790-890 ft. through ½-in. choke. Gas-oil ratio was 531 to 1. Stanolind Oil & Gas Co. and Landreth Co. 3-Q Scharbauer, Section 12, Block A, Public School Lands Survey, wildcat on the north end of the Goldsmith pool, Ector County, flowed 10 bbl. of oil and 5 bbl. of fresh water in 7 hours through 2-in. tubing with perforations from 6,200-90 ft. Texas 29 W. E. Connell, Section 9, Block B-16, Public School Lands Survey, 2 miles west of the Penwell field in southern Ector, perforated 5½-in. casing with 90 shots from 4,585-4,600 ft. in the Glorietta lime. It was washed with 500 gal. of acid and was swabbing to test. Phillips Petroleum Co., Section 25, Block B-15, Public School Lands Survey, ¾ mile west of the north end of the Penwell pool, having shown for production in the Glorietta, was drilling below 6,252 ft. in the Clear Fork.

Continental Oil Co. has filed a report with the Railroad Commission on the completion of its 1-D-133 W. R. Settles, first test in Howard County to recover oil from the Pennsylvanian. The well has been inactive for some time, having developed small production in the spring of 1945. The discovery is in Section 133, Block 29, W&NW Survey in the Howard-Glasscock (Permian lime) field. It was completed to pump 30.86 bbl. of 46°-gravity oil plus 2.58 bbl. of water through perforations from 8,910-9,080 ft. in the Strawn.

Humble Oil & Refining Co. 1 Doss, Section 1, Block A-24, Public School Lands Survey, prospective 1-mile north extension on the east side of the Doss pool in southern Gaines County, ran a 2-hour drill-stem test from 6,500-6,630 ft. and recovered 450 ft. of oil-cut drilling mud. On a later drill-stem test, tool open 105 minutes, from 6,630-6,715 ft., recovery was 650 ft. of drilling mud and 120 ft. of salt water. Operator was drilling below 6,837 ft. in lime.

Sun Oil Co. 2 N. H. Martin, Section 17, Block A-41, Public School Lands Survey, west offset to Sun 1 Martin, Clear Fork discovery in the Martin pool, Andrews County, recovered 4,346 ft. of gas-cut mud and oil, estimated at 50 per cent oil and 368 ft. of clean, free oil on an 85-minute drill-stem test from 6,790-7,050 ft. This is the same section from which Sun 1 Martin was completed but the oil from 2 Martin was reported to be freer than in the discovery. It was planned to drill ahead to explore the Simpson and Ellenburger.

Texas Pacific Coal & Oil Co. 1 Brown & Altman, Section 25, Block B-5, Public School Lands Survey, deep test in the Emperor field, Winkler County, on a drill-stem test of the Holt from 4,766-4,813 ft., 300 ft. of 40° gravity oil was recovered in 27 minutes. Drilling continued to 4,875 ft., a packer was set at 4,826 ft. and a 150-minute drill-stem test was made. Recovery was 1,800 ft. of oil and gas-cut mud and 1,350 ft. of salty water. Production in the Emperor field is in the Seven Rivers section from 2,785-2,805 ft. It was drilling below 5,341 ft. and is scheduled to drill to 6,000 ft.

WEST TEXAS SUCCESSFUL WILDCAT

Crane County: New gas-distillate field—Humble 1 Nellie M. Tucker et al, Sec. 23, Blk. 1, H&TC Sur., 1½ mi. NW McKee pool, elev. 2,423 ft., flowed 6,300,000 cu. ft. gas day with 3 to 2 bbl. distillate hourly through 36/64-in. choke, perf. 5,700-20 ft. Waddell, TD 6,344 ft.

Dawson County: New oil pool—Seaboard 1 S. E. Lee, Sec. 47, Blk. 34, T-5-N, T&P Sur., 12 mi. SE Lamesa, elev. 2,905 ft., pumped 167 bbl. day through 2-in. tubing, perf. 3,720-95 ft. San Andres, gravity 32.3°, TD 3,795 ft.

WEST TEXAS WILDCAT FAILURES

Concho County: Ventex, Ltd. 1 B. F. Jachoby, BF&F Sur. No. 70, 3 mi. W Eden, Ellenburger 3,786 ft., dry at 4,305 ft.

Crane County: Sinclair Prairie 1 Jax M. Cowden, Sec. 35, Blk. X, CCSD&RGNG Sur., 6 mi. SW Crane, elev. 2,514 ft., San Andres 2,680 ft., dry at 4,519 ft.

Dickens County: Humble 3-B Matador, Sec. 1, Blanco CSL, ½ mi. S Motley County line, elev. 2,688 ft., dry in Pennsylvania at 8,230 ft.

Sterling County: Ray A. Albaugh 1 W. N. Reed, Sec. 207, Blk. 29, W&NW Sur., ½ mi. E Glasscock County line, elev. 2,705 ft., Clear Fork 3,215 ft., dry at 5,926 ft.

(Continued on page 159)

KANSAS

Testing in Progress at Albert Pool Extension

A POSSIBLE eastern extension for the Albert pool in Barton County is the Virginia Drilling 1 Howell, SE SE NE of 36-18-15w. Five to seven bbl. of oil was swabbed from pipe set on the Arbuckle at 3,494 ft. Operators are now testing.

The Helmerich & Payne, Inc. test in Phillips County has a hole full of oil from the Lansing lime at 3,172-78 ft. The well, 1 Bowman "A," NW NW SE 3-5-20w, is north of the Hansen pool in Phillips County. A plug was set at 3,192 ft., casing perforated opposite the Lansing, and the well acidized. Lansing was topped at 3,083 ft., Arbuckle at 3,373 ft. Operators are running rods and setting pumping unit for completion tests.

Sunray Oil Corp. has started operations for a second test in the Bellman pool, Sumner County. The well is 2 Cox, NW SE NW 15-30-1e, 330 ft. northwest of the Sunray offset to the Bellman pool discovery well.

KANSAS SUCCESSFUL WILDCAT

Rooks County: Palco pool extension: Keys Drilling Co. 1 Meil, N½ NE NE 20-9-20w, flowed 211 bbl. from Arbuckle at 3,849-3,865 ft., TD 3,865 ft.

KANSAS WILDCAT FAILURES

Cowley County: Dilworth S. Hager 1 Hunt, SW SW SE 4-34-5e, dry, TD 3,584 ft., Arbuckle 3,567 ft.

Morris County: W. E. Harding 1 Kimd, SW SW NE 18-16-5e, dry, TD 2,278 ft., Mississippi lime 2,253 ft.

Ness County: Aladdin Petroleum Corp. 1 Gano, SE SE SE 20-19-26w, dry, TD 5,144 ft., sand 5,026 ft., Arbuckle 5,082 ft.

Russell County: Bridgeport Oil Kaufman B, N½ NE NW 19-15-12w, dry, TD 3,349 ft., Arbuckle 3,319 ft.

MISSISSIPPI

Chicksaw County Wildcat Recovers Gas and Oil

JACKSON.—The A. W. Hutchings 1 W. C. Stone, Jr., SE SW 29-12s-5e, showed prospects of opening a new pool in Chicksaw County, Mississippi. A drill-stem test at 2,423-2,506 ft. recovered 60 ft. of mud slightly cut with gas and a trace of oil. Operators set 5½-in. pipe and are preparing to test.

A flow of condensate at the rate of 48 bbl. a day, was recovered from the Superior Oil Co. 6 R. Batson et al, SW NE NW, 20-1n-16w. Baxterville field, Lamar County. Operators killed well at 7,655 ft., perforated at 8,820-38 ft., and are preparing to test.

The Humble Oil and Refining Co. has set an oil string at 9,113 ft. on 2 E. S. Ball, 20-2n-14e, Hub field, Marion county. Well tests are under way.

MISSISSIPPI WILDCAT FAILURE

Warren County: William Helis 1 Anderson Tully Lbr. Co., 500 ft. south and 425 ft. west of northeast corner of Lot 2 of 40-14n-3e, dry at 9,510 ft., sand and conglomerate sand 9,291-96 ft.

FLORIDA WILDCAT FAILURE

Lafayette County: Sun Oil Co. 1 Crapos, 100 ft. west of center of SW NE of 25-6s-12e, dry at 4,133 ft.

LEGAL

OIL AND GAS LEASE

UNITED STATES DEPARTMENT OF AGRICULTURE, Forest Service, Jackson, Mississippi, January 31, 1946. Sealed bids in duplicate will be received until 10:00 A.M., Central Time, March 4, 1946, and then publicly opened, offering bonus for operating rights in connection with gas and oil leases on four blocks of national forest land which are divided into thirteen parcels, located in Amite and Franklin Counties, Mississippi. Block number one contains Parcel A of approximately 402.95 acres, more or less, in Township 5 North, Range 3 East, Section 32, SE¼; S½ NE¼; E½ SW¼; S½ NW¼. Parcel B of approximately 572.36 acres, more or less, in Township 5 North, Range 3 East, Section 33, E½; SW¼; S½ NW¼. Parcel C of approximately 543.94 acres, more or less, in Township 5 North, Range 3 East, Section 34, W½ NE¼; NW¼; NW¼ SW¼; W½ NE¼ SW¼; Section 35, NE¼; N½ SE¼. Parcel D of approximately 437.20 acres, more or less, in Township 5 North, Range 4 East, Section 19, SE¼ NE¼; W½ NE¼; SE¼ NW¼; W½ NW¼; SW¼; Section 20, SW¼ NW¼. Block number two contains Parcel A of approximately 784.32 acres, more or less, in Township 5 North, Range 3 East, Section 37, S½ S½; Section 42, N½; SE¼; NE¼ SW¼; S½ SW¼. Parcel B of approximately 467.01 acres, more or less, in Township 5 North, Range 3 East, Section 43, NW¼; W½ NE¼; E½ SE¼; N½ SW¼; SW¼ SW¼. Parcel C of approximately 575.68 acres, more or less, in Township 4 North, Range 3 East, Section 3, W½; NE¼ NE¼; S½ NE¼; W½ SE¼; NE¼ SE¼ less 26.43 acres. Block number three contains Parcel A of approximately 485.48 acres, more or less, in Township 4 North, Range 3 East, Section 9, E½ W½; E½ NE¼; SE¼; SW¼ NE¼; W½ NW¼ NE¼; W½ E½ NW¼ NE¼. Parcel B of approximately 711.60 acres, more or less, in Township 4 North, Range 3 East, Section 10, entire. Parcel C of approximately 715.94 acres, more or less, in Township 4 North, Range 3 East, Section 11, W½ W½; SE¼ SW¼; SW¼ SE¼; Section 14, N½ NW¼; N½ SW¼ NW¼; Section 15, N½. Block number four contains Parcel A of approximately 640.46 acres, more or less, in Township 4 North, Range 4 East, Section 5, entire less E½ NE¼ SE¼. Parcel B of approximately 700.75 acres, more or less, in Township 4 North, Range 4 East, Section 6, E½; Section 7, N½; NE¼ SE¼; E½ NW¼ SE¼, except 2 acres in a strip across the south end. Parcel C of approximately 531.57 acres, more or less, in Township 4 North, Range 4 East, Section 8, N½ except 1 acre in a square in SE corner of SE¼ NE¼; N½ SW¼; NW¼ SE¼; and 1 acre in a square in NW corner of NE¼ SE¼; Section 9, NE¼ NW¼; SW¼ NW¼. Bids may be submitted for an entire block or separately for any or all parcels thereof, or in both ways. If the aggregate of the several high bids on the individual parcels of a specific block exceeds the maximum bid for the block as an entirety, the bids on the parcels will be accepted. If, however, a bid on a block as an entirety is higher than the aggregate of the high bids on the several parcels thereof, then the bid on the entire block will be accepted. Award of lease will be made only to bidder who can show sufficient experience and financial resources and prove citizenship. Interested parties may obtain bid documents, lease forms and operating regulations from the Forest Supervisor, Masonic Building, U. S. Forest Service, Jackson 114, Mississippi.

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"REFLEX"
WATER GAGE SET

For oil field, locomotive type and marine boilers. Water shows black — steam shows white; the water level is unmistakable. U-Bolt construction is strongest and simplest to service. Glass replaced by simply removing nuts on face of gage . . . unnecessary to work between gage and boiler. Conforms with A.S.M.E., Federal and State requirements when used for pressures specified by their respective codes.

This is one of the complete line of Penberthy gages that meet every liquid level gage requirement.

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Lifting Heavy Loads is Easier Now!

No. 50HJ, capacity 50 tons. Two pumps, high and low speed, can be operated singly or in unison. No. 30HJ, same design, capacity 30 tons. Single pump types; 3, 5, 8, 12 and 20 tons capacity.

Simplex 30 and 50-ton Hydraulic Jacks have eliminated heavy load lifting from the list of tedious, time-consuming jobs. Can be used in horizontal or vertical position, and have double lever sockets to speed operation in close quarters. Ruggedly built with a safety factor of 50%.

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LEVER SCREW HYDRAULIC
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Templeton, Kenly & Co.
Chicago (44), Illinois
Better, Safer Jacks Since 1899

Among the Drilling Contractors

Keating Drilling Co. will drill the 2 Clark Brown, 930 ft. south and 561 ft. east of northwest corner of SW of 11-11n-7e, in Coles County, Illinois, for Kingwood Oil Co.

Fisher Drilling Co. is preparing to spud a wildcat in Wayne County, Mississippi, for R. L. Fisher. The well is the 1 G. M. & O. R. R. Co. SE NE 22-9n-8w.

Canadian Exploration Co. of Calgary, Alta., has seismographic crews working in an area west of Didsbury, Alberta, under weather conditions that necessitate use of a bulldozer to clear roads for the trucks through the drifts.

Dixie Drilling Co. is building roads preparatory to drilling the 2 George W. Armstrong, in Section 29-7n-1w, Adams County, Mississippi. The contract is with California Co.

Cox Drilling Co. has the contract to drill a well for Chester Oil Co. The well is the 1 Evert Hunt, 330 ft. from south line and 670 ft. from east line SE NE 14-1s-10w, Gibson County, Indiana.

Northern Development Co. of Edmonton has started work on Community Services 9, LSD 4, 11-49-28w3 in the Saskatchewan portion of the Lloydminster field.

Crow Drilling Co. completed a test for the Gulf Refining Co. in the Baxterville field, Lamar County, Mississippi. The well, 1 Simpson, 8-1n-16w, was drilled to total depth of 3,810 ft.

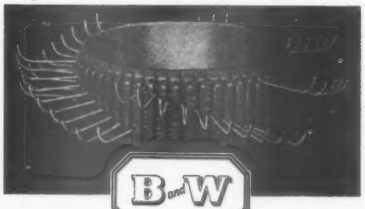
Midwest Drilling Co. has contract to complete Northern Royalties 3 in the Kamsack field of eastern Saskatchewan, standing in lime at 1,763 ft. since a cyclone wrecked the derrick in 1944. Work will be supervised by G. G. Hussey.

Creighton Drilling Co. is drilling ahead on the 1 Scott, SW SW SE 34-10n-10e, in Okfuskee County, Oklahoma, for Johnson & Gill.

Jake Vance Drilling Co. is the contractor to drill the W. Wallace Damron, Jr., Adm. 2 Fred Boyd, SE SE 30-7s-6w, Spencer County, Indiana.

Pioneer Drilling Co. is moving in rotary tools preparatory to drilling

Paul Courtney, sales manager Houston plant of Emsco Derrick & Equipment Co.; M. W. Grant, petroleum engineer, the California Co., Harvey, La., and Ray Bedingfield, tool pusher for N. H. Wheeless Drilling Co.



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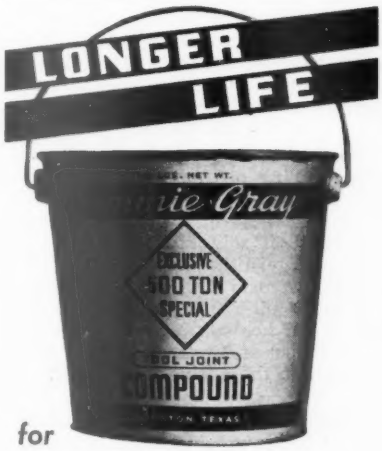

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*Trade mark Reg. U. S. Pat. Off.

the 6 R. E. O'Nan, 21-O-22, in the Dixie pool, Henderson County, Kentucky. The contract is with Carter Oil Co.

Glenn Pool Drilling Co. was awarded contract by Bird & Boreing Oil Co. to drill a wildcat test in Rooks County, Kansas. The well is 1 Veverka, SW SW 27-8-19w.

Morris & Meredith is the name of a new drilling contracting firm which has its headquarters in the Niels Esperson Building, Houston. Byron Meredith recently resigned as Gulf Coast division superintendent for Sinclair Prairie Oil Co., to become associated with S. W. Morris in the new venture.

Dixie Drilling Co. is building roads preparatory to drilling the 2 Homochitto Lumber Co. for California Co. Location is 29-7n-1e in the Cranfield field, Franklin County, Mississippi.

Lohman-Johnson Drilling Co. will drill the C. Wood 1 J. H. Spore, NW NW NE 19-2s-11w, Gibson County, Indiana.

E. F. Moran Drilling Co. has contract with Carter Oil Co. to drill the 4 Provident Mutual, NE SE NW 14-4s-7e, in Hamilton County, Illinois.

George Wrather Drilling Co. will drill the R. E. Johnston 1 E. E. Elliott, NW SW 23-5s-14w, in Posey County, Indiana.

Fleming Drilling Co. has been organized by Francis Fleming, Evansville, and Dee A. Repogle, Oklahoma City. They are operating in the Illinois Basin.

Permian Basin

(Continued from page 157)

Tom Green County: Harley Sadler 1-34 Bob Mims, Sec. 34, Blk. 5, H&TC Sur., 2 mi. SW Funk pool, elev. 2,480 ft., dry in San Andres at 925 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Mid-Continent Petroleum Corp. 1 Christmas, 17-22s-37e, 1½ miles northwest of Neville G. Penrose, Inc. 1 Federal-Penrose, opener of the Eunice Ellenburger field of southeastern Lea County, is dry at 6,550 ft. in lower Permian lime. One-fourth of a mile north of the discovery Rowan Drilling Co. 3-B-9 Elliott, 9-22s-37e, is a new Ellenburger producer, having been completed to flow 1,132 bbl. of oil daily through perforations from 8,105-80 ft. Continental Oil Co. 1 Mullis, 21-15s-29e, 5,200-ft. test 20 miles northeast of Artesia, Chaves County, was drilling at 5,261 ft. in lime.

Lovington field, Lea County, reported two completions this week and the Penrose-Skelly field, Lea County, three. Grayburg-Jackson field, Eddy County, had two locations and Caprock field, Lea County, one. Eddy County has 29 active drilling wells with 7 wildcats and Lea County has 38 with 7 wildcats.

SOUTHEAST NEW MEXICO WILDCAT FAILURES

*Lea County: Van S. Welch 1 State, 31-20s-33e, elev. 3,611 ft., dry at 3,695 ft.

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Scrapes the inside of your casing to its full I.D.

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Removes hard cement and all burrs from gun-shot holes.

Best time to do this important operation is when the bit is run to drill out cement. Leaves inside of casing smooth and clean. Prevents future damage to packers or swabs; makes all "down-the-hole" jobs safe and easy.

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CLEAN MUD PAYS OFF!

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GULF COAST AND MID-CONTINENT REPRESENTATIVE
McNEELY MATERIALS CO.
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PERSONALS

Carney Will Assist in Shamrock's Plan For Expansion

B R. CARNEY, recently named special assistant to J. H. Dunn, president of Shamrock Oil & Gas Corp., in an expansion program, has been consulting chemical engineer for the company since July, 1945.

Following courses in chemical engineering at Notre Dame University and Columbia University, Carney studied geology at University of Tulsa. In 1926, he joined Shell Oil Co., Inc., serving as chief technologist at its East Chicago refinery, staff technologist in the head office in New York, and manager of the natural-gas and gasoline division in the Mid-Continent area.

The new executive is chairman of the American Petroleum Institute's committee on measuring, sampling, and testing natural gasoline. Previously he served on various other technical committees of the organization. He has been active in the Society of Automotive Engineers and the American Society for Testing Materials.

Louis E. Hanson has been named comptroller and **Edward P. Fischer** an assistant treasurer of Socony-Vacuum Oil Co., Inc. Hanson, formerly assistant comptroller, takes the place of **Arthur T. Roberts,** who retired. Fischer, in the treasurer's department since 1932, fills the vacancy created by the promotion of **John F. Seal** to treasurer.

Philip Berard, president of Vacuum Oil Co. of France, left New York City January 18 to return to France after a 2-week stay here.

William C. Imbt, Midland, Tex., has been named district geologist for the West Texas-New Mexico division of Stanolind Oil & Gas Co.

E. L. Selk, formerly of Tulsa, has joined the Oklahoma City staff of Stanolind Oil & Gas Co. as senior geologist.

George J. Vogan, production department supervisor for United Natural Gas Co. in Pennsylvania's Henderson field, has been retired after 28 years of service which began when he went to work for the company as a laborer in 1917.

Clifton L. McCown, formerly of Hobbs, N. M., has become a consulting geologist in Oklahoma City.

K. L. Simons, for 44 years a gas utility executive, has been retired as a vice president and manager of the Houston division of United Gas Corp. Ten of the 50 employes and officials of the company retired February 1 were honored at a recent dinner in Houston. **W. B. Head, Jr.,** will succeed Simons as Houston division manager; **J. A. Wilson** will take Head's position as assistant Houston manager, and **J. S. Cage** will succeed Wilson as manager of the Monroe, La., division.

A. F. T. Seale, formerly of Denison, Tex., has joined the engineering staff of Kerr-McGee Oil Industries, Inc., in Oklahoma City.

Argo A. Hawkins, former scout for British-American Oil Producing Co., has been appointed assistant division landman in the Rocky Mountain area and transferred to Casper, Wyo.

George C. Getgood, of the crude oil purchasing department of Standard Oil Co. (Indiana) has been transferred to Denver in charge of a new office opened in that city with headquarters at 406 First National Bank building.

P. E. Keegan, former head of industrial relations for the Houston refinery of Shell Oil Co., has returned to the plant to assume the newly created position of superintendent-administration. He previously was in the New York office of the company as assistant manager of the personnel department.

Paul T. Vockel, former office manager of the chemical division at the Houston refinery of Shell Oil Co., has been promoted to assistant treasurer of the newly established eastern division office of Shell Chemical Corp. in New York.

Richard Rollins, director of public relations of Atlantic Refining Co., has been elected secretary of the company.

B. F. Daily, senior inspector for Shell Pipe Line Corp. at Big Lake, Tex., has been named West Texas area construction supervisor, succeeding **E. O. Kemper** who resigned.

Fred M. Butler, Cities Service Oil Co. executive at Bartlesville, has been named alternate industry member of the Eighth Regional Wage Stabilization Board. Butler formerly served as industry member of the regional War Labor Board which was terminated January 2.

George T. Hardin, Jr., formerly geologist and petroleum engineer for Carter-Gragg Oil Co., and **Charles B. Musick,** geological engineering draftsman, have joined the staff of Michel T. Halbouty, consulting geologist and petroleum engineer in Houston.

H. T. Morian, believed to be the oldest living oil man, has celebrated his ninety-seventh birthday. A resident of Bradford, Pa., he purchased the first oil sold at the Drake well when he visited the well with his father August 28, 1859, and bought a pint of oil for 2 shillings. At the age of 12, he took a $3.50 a day job as a driller and retired in 1934 after 73 years in the business.

John C. Flanagan, for 15 years assistant to the president of United Gas Co., has been elected vice president and appointed assistant general manager for the operating division with offices in Houston.

Robert P. Wilson has returned to Interstate Oil Pipe Line Co. as junior engineer at Mattoon, Ill., following his release from the Army.

S. F. Shaw, consulting engineer, has returned to his San Antonio office from the Wilmington field, California, where he made a study of gas-lift conditions.

Keith E. Anderson is scheduled to join the Missouri Geological Survey

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EJECTORS

Use the power of steam, air or water under pressure to lift liquids. Being simple jet pumps they have no moving parts and require no lubrication. A variety of models to meet different conditions. Also used as water heaters.

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DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

and begin an investigation of ground water following his discharge from the Army. He has been stationed in the Oklahoma City recruiting office as a staff sergeant. Before entering the service he was with the U. S. Geological Survey at Iowa City, Iowa.

Bert B. Newton, vice president of Gulf Oil Corp., is back in the United States from a 4-month tour of the corporation's plants in Europe. In New York, he said the European economic outlook is "not unhopeful." Gulf plants abroad, he added, suffered little property damage but other companies were "hard hit."

William B. Berwald, chief engineer of Ohio Oil Co., has been elected 1946 chairman of the Mid-Continent section of the American Institute of Mining and Metallurgical Engineers.

Collin Reith has been named vice president in charge of production for Standard Oil Co. of Texas succeeding **E. S. White** who resigned. Reith has been associated with Texas Standard and with Standard Oil Co. of California for several years.

Dr. Alberto Camacho, Colombia's minister of petroleum, is scheduled to attend the February 23 annual meeting of Colombia Petroleum Institute, with Colombia's president **Dr. Alberto Lleras,** accompanying him as an honored guest. **Dr. Felix Mendoza,** now at the University of California studying oil management problems, is expected back in May and is candidate for the C.P.I. presidency. He was C.P.I.'s first president.

E. V. Murphree, vice president of Standard Oil Development Co., is slated to receive the 1945 Chemical Engineering Achievement Award for his company at the February 26 formal presentation ceremonies.

F. W. Abrams, board chairman of Standard Oil Co. (New Jersey), has been elected to the board of Ethyl Corp.

W. S. S. Rodgers, chairman of The Texas Co., **William F. Moore,** general manager of the company's foreign operations, and **Raymond F. Baker,** chief geologist and assistant to the vice president in charge of production, returned recently from a trip to Colombia.

Eduardo Lopez, director and vice president of Companias Unidas de Petroleo, left Colombia recently for a trip to the United States.

E. L. Patchett has been named chief geologist of Richmond Petroleum Co. de Colombia, and **Ignacio Bonillas,** who formerly held this job, has been transferred to Venezuela. **M. E. Hoover,** Richmond general manager, recently left on a trip to Mexico.

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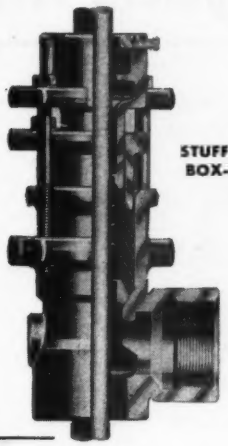

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Equipment Men in the News

Morrison Made Sales Engineer For Gaso Pump & Burner

A. L. MORRISON

Arthur L. Morrison, recently discharged veteran, has been appointed sales engineer of Gaso Pump & Burner Manufacturing Co., with headquarters in Dallas, according to H. F. Stover, executive vice president of the company. Morrison joined the Gaso organization in 1940, following graduation from Oklahoma University. Entering the service in 1943, he was a flying instructor until March 1945, when he began training as a fighter pilot.

LaLande to Head Whitemarsh Research Laboratories

Dr. W. A. LaLande, Jr., has been appointed director of Whitemarsh Research Laboratories of Pennsylvania Salt Manufacturing Co., Dr. S. C. Ogburn, Jr., manager of research and development has announced. Dr. LaLande, a native Philadelphian, received his undergraduate and graduate training at University of Pennsylvania prior to spending a year at the Swiss Federal Polytechnic Institute at Zurich.

Chick Named Mid-Continent Representative for Oshkosh

JOHN S. CHICK

John S. Chick of Tulsa has been appointed representative in the Mid-Continent territory for Oshkosh Motor Trucks, Inc., Oshkosh, Wis., according to J. S. Mosling, president. Chick is a graduate engineer from Cornell and has spent 15 years in the oil industry in production and drilling, petroleum engineering and sales and service engineering with the Skelly, Shell and Carter Oil companies and Baker Oil Tools, Inc., of Los Angeles.

Jack Moyar Made Security Mid-Continent Manager

Jack H. Moyar, former division manager for Stanolind Oil & Gas Co. in East Texas, West Texas, the Panhandle and New Mexico, has joined the staff of Security Engineering Co., Inc., as Mid-Continent manager and will have charge of all operations east of the Rocky Mountains. After attending the general sales meeting of Dresser Industries at Mineral Wells, Tex., he will make a complete trip to all of the Mid-Continent fields, and will then establish his headquarters in Fort Worth.

Frank Crow Joins Murray Rubber as Chief Engineer

FRANK CROW

Murray Rubber Co. of Houston, manufacturer of molded rubber parts for oil-field equipment manufacturers, announces the appointment of Frank Crow as chief engineer. Crow was previously a member of the engineering staff of Cameron Iron Works. Announcement is also made of the return of Lynne Murray, Jr., and Edward Murray, both of whom left their positions with the rubber company to enter the

LYNNE MURRAY

EDWARD MURRAY

Army. Lynne Murray, Jr., will direct the sales promotion department while Edward Murray has resumed his old position as plant manager.

Protin New Pittsburgh Steel Vice President; Heads Department

Joseph H. Carter, president of Pittsburgh Steel Co., has announced the appointment of E. J. Protin as vice president in charge of a newly created products development research division. J. H. Morrison, who rejoined the company last October as general works manager, has been named vice president in charge of operations, a post which Protin has held since 1942.

Victor Elects Two Vice Presidents

E. A. "Ernie" Daniels and E. O. "Ed" Williams have been elected vice presidents of Victor Equipment Co. Daniels, formerly

E. A. DANIELS

E. O. WILLIAMS

general sales manager, becomes vice president in charge of sales, and Williams, formerly district manager, with offices in Los Angeles, becomes vice president and manager of the southern California district.

Bettis Sales Co. Announces Change of Name

Since January 1, Bettis Sales Co. has operated under the name of Bettis Corp. All present personnel will be retained in the new organization, according to John M. Sheesley, president. Sheesley also announced the purchase of a 1-acre site in the projected Oil Field Supply Row Center in Houston, on which construction of a warehouse and office building will soon begin. The new plant will cover approximately 15,000 sq. ft.

Timken-Detroit Axle Co. Promotes Sales Executives

Neil S. Lincoln has been named sales manager of the automotive division of Timken-Detroit Axle Co. Lincoln joined Timken in 1942. C. C. Bartell, who joined the organization in 1939, has been made sales manager of the special equipment division. H. C. Maddux, who has been active in the trailer industry for Timken since the beginning of this branch of the business, becomes sales manager of the trailer division. E. E. Weiss, who has been associated with Timken's bus-axle sales for many years, is now assistant sales manager of the bus division. E. E. Petsch and R. V. Hessler have been appointed assistant sales managers of the eastern and western divisions, respectively. J. H. Balog has been named manager of the sales office and B. B. Lewis, manager of the sales order department.

Houston Oil Field Material Co., Inc., recently presented to J. E. Lassiter, sales manager, T. C. Smith, general superintendent, cutting and fishing tool department, and A. W. Waddill, vice president in charge of sales, a 15-year service award. These awards are made into star-shaped lapel pins with a ruby on each point. Only seven other members of Homco possess this award